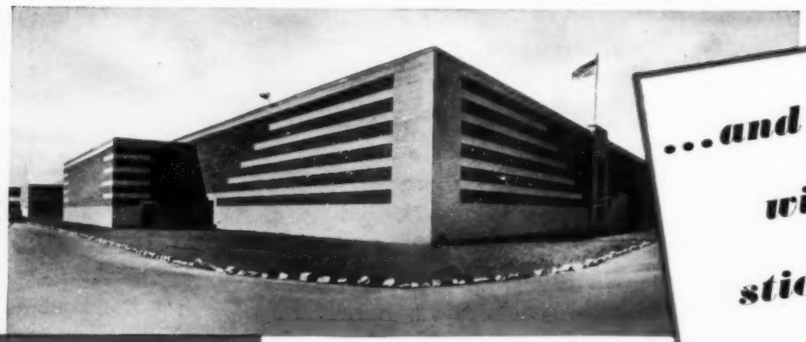
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

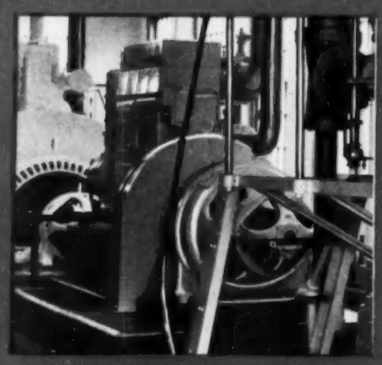
AUGUST, 1940 CIRCULATION OF THIS ISSUE—IN EXCESS OF 14,000 COPIES 25c

5-ACRE FACTORY...without a window

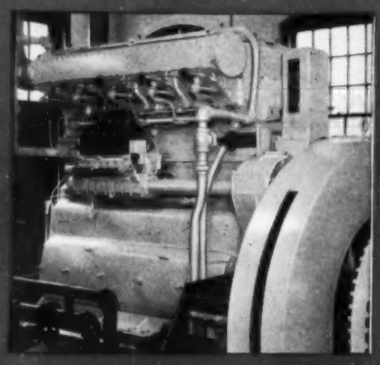


5-ACRE windowless, stairless, elevatorless factory of Simonds Saw & Steel Co., Fitchburg, Mass. Lighting is shadowless, fluorescent. Walls and roof absorb 93% of the noise of manufacturing.

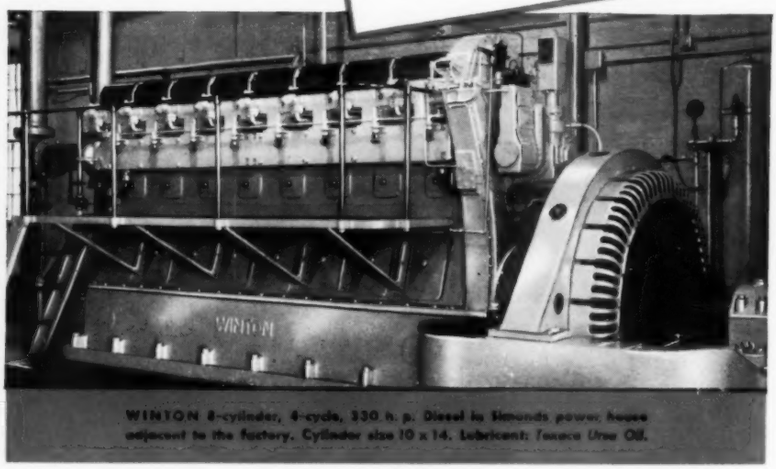
...and 3 DIESELS without a sticking ring



SUPERIOR 4-cylinder, 4-cycle Diesel. Cylinder 9 x 12. 150 h. p. at 314 r. p. m. Lubricated with Texaco Ursa Oil.



McINTOSH & SEYMOUR 5-cylinder, 4-cycle Diesel. Cylinder size 12⅛ x 15. 375 h. p. at 360 r. p. m. Lubricated with Texaco Ursa Oil.



WINTON 8-cylinder, 4-cycle, 330 h. p. Diesel in Simonds power house adjacent to the factory. Cylinder size 10 x 14. Lubricant: Texaco Ursa Oil.

ONE OF the modern architectural wonders, the plant of Simonds Saw & Steel Co., Fitchburg, Mass., has a 5-acre windowless, partitionless, sound-absorbing shop.

Modern as tomorrow is the adjacent gleaming white Simonds power plant equipped with McIntosh & Seymour, Winton, and Superior Diesels.

Chief Engineer C. B. Newell says—*"Texaco Ursa Oils* keep these engines clean. There is no gumming or sludging. Piston and cylinder wear is nil. Any carbon formation is soft, causing no ring sticking." And then Mr. Newell adds—"The engineering and laboratory service of The Texas Company has been most cooperative."

Trained lubrication engineers will gladly cooperate in making savings with *Texaco Ursa Oils* in *your* Diesels. Phone the nearest of more than 2300 warehousing points in the 48 States, or write:

The Texas Company, 135 E. 42nd St., New York, N. Y.

TEXACO

REG. T.M.

TEXACO DEALERS INVITE YOU to tune in The Texaco Star Theatre—starring Kenny Baker and Frances Langford—Every Wednesday Night—Columbia Network —9:00 E.D.T., 8:00 E.S.T., 8:00 C.D.T., 7:00 C.S.T., 6:00 M.S.T., 5:00 P.S.T.

TEXACO Algol and Ursa Oils

DIESEL PROGRESS and DIESEL AVIATION

REX W. WADMAN
Editor and Publisher

HEYWORTH CAMPBELL
Art Director

PAUL H. WILKINSON
Aviation Editor

CONTENTS AUGUST, 1940

FRONT COVER ILLUSTRATION: New Waukesha-powered Rail Car for Susquehanna Railroad. See details on pages 26 and 27 of this issue.

TABLE OF CONTENTS ILLUSTRATION: View of the six cylinder, 380 hp. Atlas Imperial Diesel engine as installed on the Pan American Petroleum Tugboat *Pan Five* which is described in some detail on pages 40, 41, and 42 of this issue.

DIESEL PROGRESS for August, 1940. Vol. VI, No. 8. Published monthly by Diesel Engines, Inc., 2 West 45th St., New York, N. Y. Tel. MUrray Hill 2-5092. Subscription rates: U.S.A. and Possessions, $3.00 per year; 25c per copy. All other countries, $5.00 per year; 50c per copy.

The Diesel-Electric Ferry "Hamilton" now in successful operation on the Hudson River.

DIESEL-ELECTRIC FERRY TAKES AN OCEAN VOYAGE

ALTHOUGH Hudson River ferryboats are hardly considered ocean-going vessels, or were not so considered until recently, the American public has long been accustomed to striking advances in transportation wherever Diesel engines have been employed. Hence, to the average person, the news of the arrival off Sandy Hook of the Diesel Ferry "Hamilton", nine days out of Port Arthur, Texas, was interesting mainly because no one would expect to find a 23rd Street-Weehawken ferry among "Incoming Ships" rather than because such a trip should be considered impossible or even dangerous for modern Diesel propulsion engines, even in a vessel designed for smooth water, ferry service. To marine owners and operators, however, this recent voyage of the "Hamilton" carried great significance and incontestable proof of marine Diesel performance.

When Electric Ferries, Inc., contracted for two new units, it was advisable economically to order the construction of these boats from the Levingston Shipyard at Orange, Texas. The problem of transferring them to New York on completion worried neither the owners nor Eads Johnson, their Naval Architect, due to the previous experience of both with Diesel-electric propelled vessels of this type. Despite the fact that hull design did not anticipate deep-water service and machinery arrangements were based on intermittent, stop-and-go operation, there was not the slightest hesitation about ordering a 2000 mile coastwise cruise immediately after acceptance on builders' trials. Before quoting from Captain Deal's log of this unusual trip, a brief description of the "Hamilton" and her propelling machinery should be given.

Principal dimensions of the hull are as follows:

l.o.a.	185′–0″
beam	55′–0″
depth	15′–6″
draft	8′–6″

Construction is of all-welded steel throughout to American Bureau standards, and hull lines are typical of the successful ferry boat practice developed and perfected by Eads Johnson. Diesel-electric propulsion was supplied by General Motors and is similar to the many Diesel-electric, all-General Motors marine power plants now operating in heavy-duty service. The main engine is a General Motors 12 cylinder, 2 cycle, V-type Diesel rated at 950 hp. at 750 rpm., and directly connected to an Electro Motive generator. As is standard with this design, all necessary auxiliaries are engine-mounted and the exciter for the generator is chain-driven from the main shaft. The entire main generating unit is offset from the center line of the hull to clear the propeller shaft, which connects to a "wheel" at each end of the vessel. A single 750 hp. motor drives the shaft through a Farrel-Birmingham reduction gear, reducing motor speed of 650 rpm. to a shaft speed of 180 rpm., to give a service speed of twelve knots.

For the ocean voyage to New York, a special crew was furnished by the Moran Towing & Transportation Company, owners and operators of the well-known Moran towboat fleet, which is powered extensively by General Motors Diesel-electric equipment. Captain Deal with his officers and crew reported for duty on board the M F "Hamilton" at Orange, Texas, on Wednesday, May 29. After two days of final inspection and fitting out, compass adjusting,

The decks were awash for hours at a time on the "Hamilton's" trip up the coast.

etc., the vessel proceeded to sea at 4:45 P.M. Friday, May 31. The sky was overcast with a moderate southerly breeze which brought light rain at midnight. The course of this voyage is shown clearly by the accompanying chart which shows the stop at Miami as the only break in the trip from Port Arthur to New York, or a total sea distance of 2,100 miles.

The following excerpts from Captain Deal's log provide terse but informative commentaries on conditions encountered:

"Sunday, June 2, 10:30 PM, Cape St. George LHΘ 9½ miles off. Overcast. Fresh SE breeze. Bar. 29.97. Choppy sea.

"12:00 PM, Course E¼N Overcast, rough sea, Fresh SE breeze. Bar. 29.98, Vessel rolling and pounding at times."

What Captain Deal's log does not record is that the main deck was awash during Sunday night and most of the following day, and despite the sea and strong wind, the progress of the ferry was little affected. Weather conditions could hardly be called ideal for this trip as illustrated further from the log for Wednesday, June 5:

"7:55 AM Carysfort LHΘ 2½ miles, Mod. SE Breeze, rough sea, Bar. 30.02, Vessel pounding heavily.

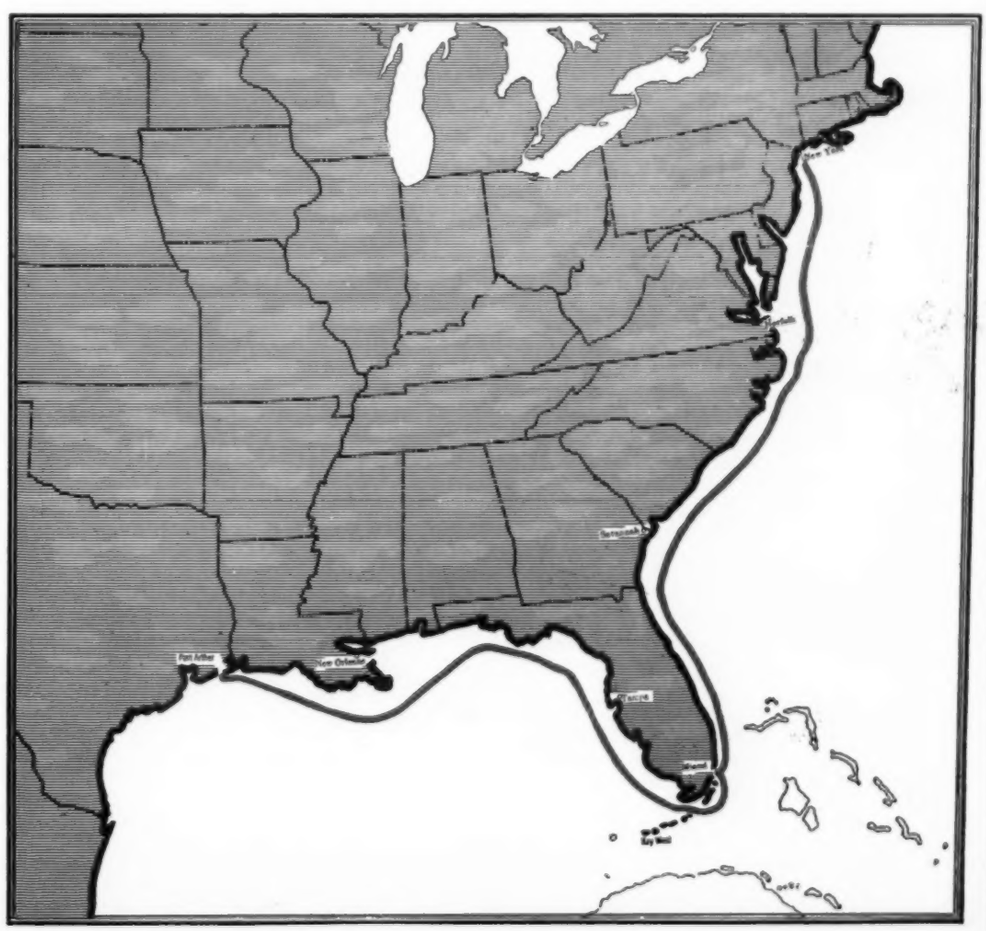
"8:52 AM Pacific LHΘ 1½ miles, Mod. breeze, rough beam sea, vessel pounding and rolling."

Similar conditions existed on several subsequent days so that the final entry in the log is particularly significant:

"Monday, June 10, 12:00 PM, Arrived off docks of Electric Ferries, Inc. at Hoboken, N. J. Total sea distance 2100 miles. Total sea time 9 days, 6 hours, 20 minutes. Average speed for sea voyage 9.45 miles per hour."

Although it is extremely unlikely that the "Hamilton" will ever be called upon again to "put to sea", no more exhaustive trial trip could be imagined for a boat entering Hudson River service, and it should be a source of satisfaction to the owners to realize the tremendous factor of safety as well as reserve power and strength of both hull and machinery. As the second of their new Diesel-electric ferries to make this trip and then enter immediate local service, the "Hamilton" has emphasized what her sister ship, the "E. G. Diefenbach", demonstrated, that marine Diesels "can take it". Their rugged dependability and proven operating economy fully justify the ever increasing preference for this modern type of marine propulsion.

The course of the D.E.F. "Hamilton" from Sabine Pass, Texas, to New York.



Exterior view, interior view, and the operator's station of the Susquehanna Railroad's new Rail Cars.

SUSQUEHANNA RAIL CARS

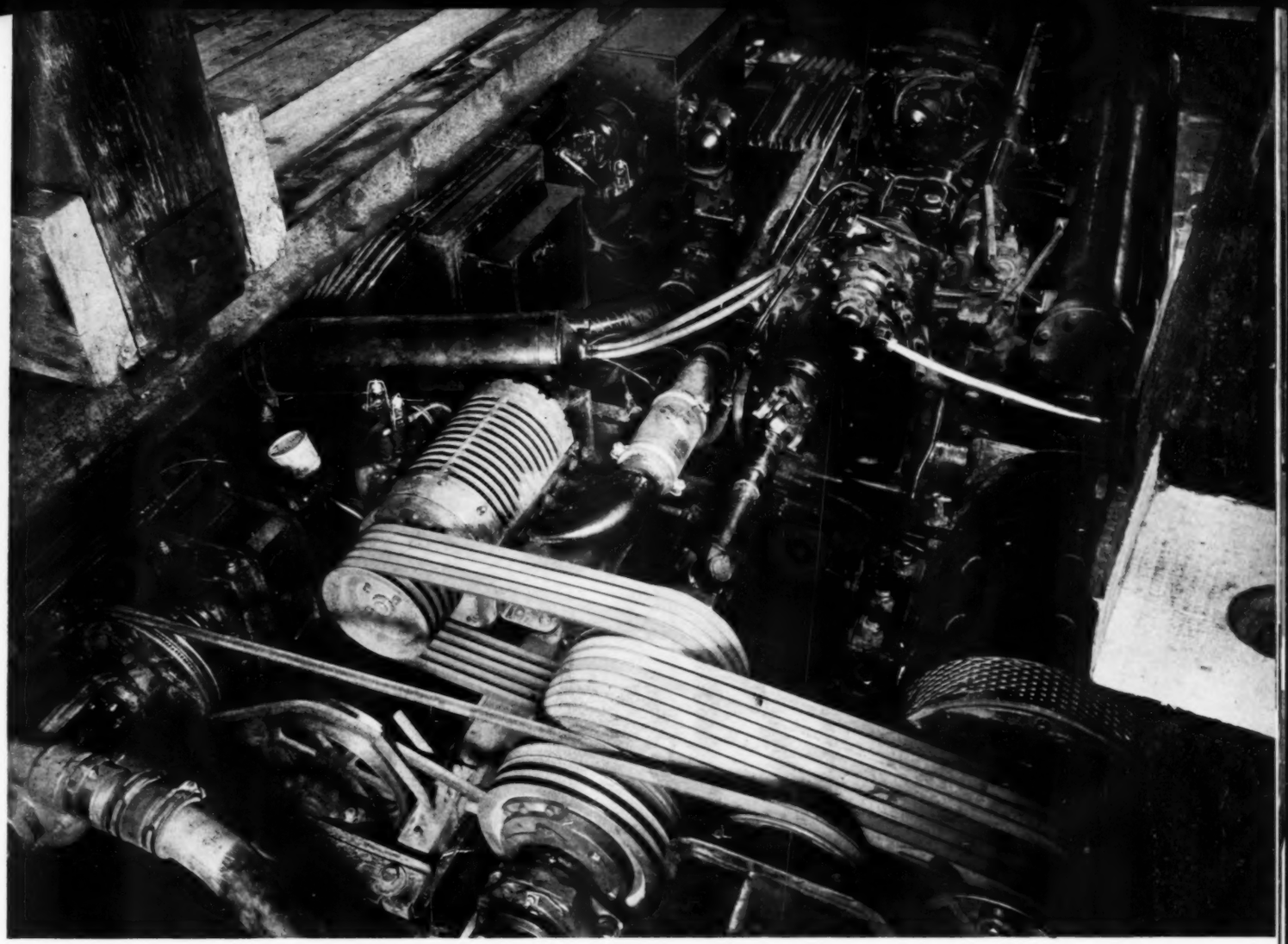
By WILBUR W. YOUNG

TWO new self-propelled rail cars, embodying many interesting design features, were recently placed in commutation service between Paterson, N. J., and Susquehanna Transfer on the New York, Susquehanna & Western Railroad. This new equipment was welcomed by commuters along the route since it offers fast, clean, and comfortable transportation via bus connections, through the Lincoln Tunnel, to Times Square, New York.

Moderate streamlining and three-tone color treatment with chromium trim give these cars a superb appearance. For this and for the interesting mechanical treatment, credit goes to the American Car and Foundry Company, designers and builders of this equipment.

Power for locomotion, air conditioning, and lighting is supplied by a Waukesha-Hesselman six cylinder, 6¼" bore, 6½" stroke, supercharged, 290 hp. oil engine. This engine is of the flat bed or "pancake" type and is mounted directly under the car floor in a three-point suspension fitted with Lord bushings. Starting is accomplished by a push button-controlled Delco 12 volt motor, the engine using gasoline for fuel during a short warming up period after which it functions entirely on Diesel fuel. The engine is governed to a top speed of 1800 rpm. at which speed the car travels at 60 mph.

The drive linkage between the engine and No. 1 truck, which is the driving truck, incorporates a Twin Disc hydraulic torque converter, a Spicer universal joint and an ACF differential. Within the torque converter lies the reason for the smooth starting and smooth acceleration so essential to the comfort of passengers as well as to the life of the engine and running gear. The torque converter itself is not news. Its characteristics were fully discussed in the November, 1939, issue of DIESEL PROGRESS. A new feature has been incorporated in these particular Converters; namely, the introduction of a direct drive combined with a Duplex Freewheel unit. The patented Twin Disc overcenter toggle-action clutch is utilized for shift-



Worm's eye view of the six cylinder "pancake" Waukesha oil engine installed under the floor of these new rail cars. Photograph taken from pit looking up towards under part of engine.

ing from hydraulic drive into direct drive. During the acceleration period, the hydraulic drive is used; when the car reaches a speed of 35 to 40 mph., the shift is made to achieve direct drive. Due to the action of the first freewheel unit, any drag of the hydraulic portion is eliminated when the car is operating in direct drive. The second freewheel unit permits the rail car to overrun the engine during periods of drifting when operating in direct drive. The shift from forward to reverse at the axle is push button controlled, and is actuated by air pressure from the brake system. The hydraulic and direct drive features as well as the free-wheel devices are controllable at either end of the car with the car operating in reverse when the No. 2 truck is leading.

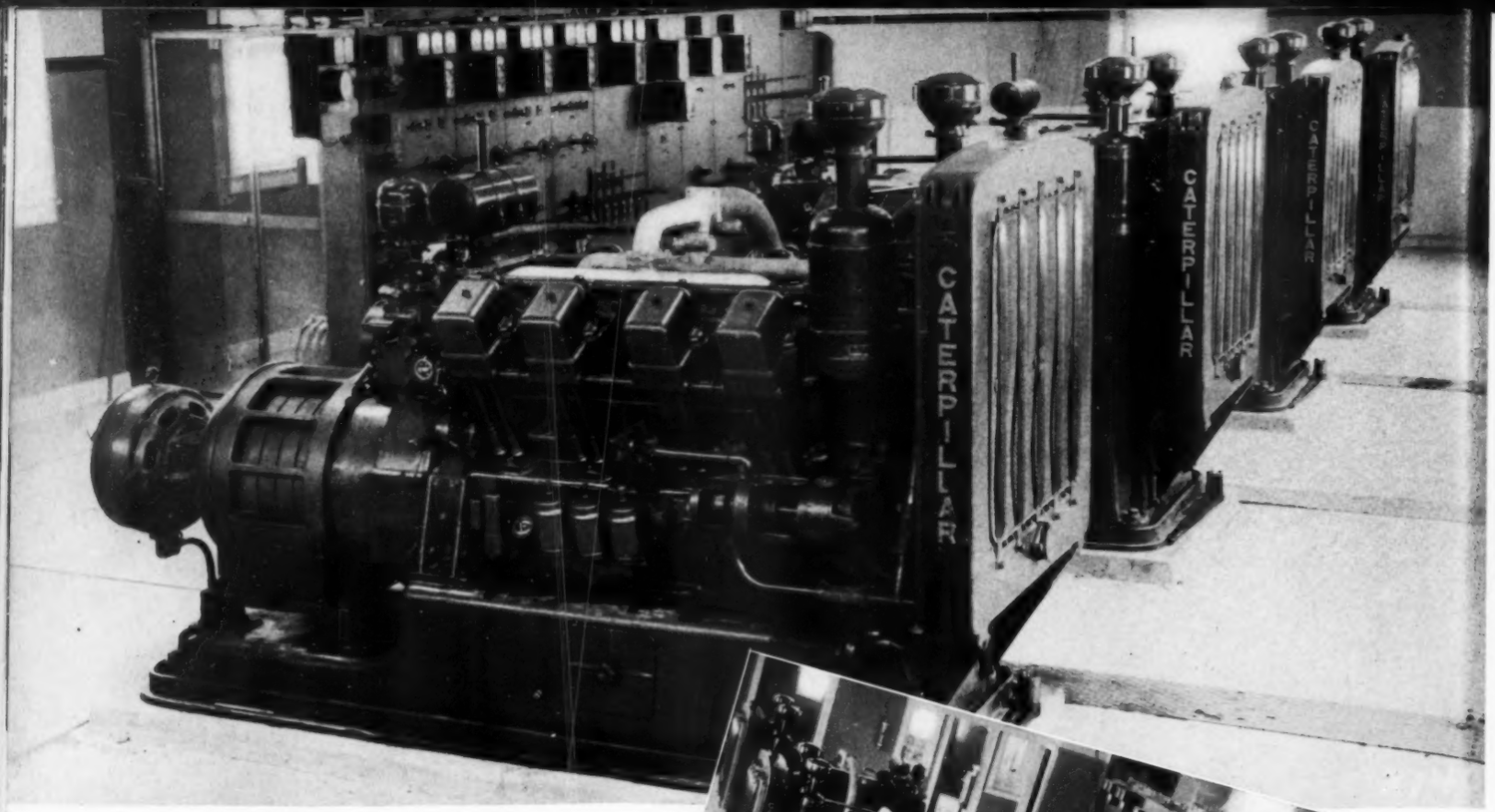
Mounted on the rear extension of the engine crankshaft are V-belt sheaves for driving the cooling water pump, the 12 v. starting battery charging generator, the 125 v. 20 kw. lighting generator, the supercharger and the air and refrigerating compressors. Both generators are General Electric, and both batteries are Exide. The 125 v. battery is a 56 cell unit and it floats on the lighting circuit.

The overall output of this compact power unit is another fine example of the advantages of supercharging. In this case a McCulloch positive displacement blower is employed. This unit offers performance characteristics which render it well suited to this service. It is quiet as to intake pulsations, relatively free from torsional vibration and its delivery pressure is uniform.

Engine cooling is effected with a closed system through Young radiators which are fitted with thermostatically-controlled Kysor shutters. The car heating system is connected in the jacket water circuit and heating is supplemented, when necessary, by a 14 kw. electric element. This system also handles the exhaust manifold cooler. Intake air is supplied through a Donaldson filter. Mounted transversely and ahead of No. 1 truck is the Burgess exhaust Snubber.

Fitting this power plant and its many accessories under a rail car and allowing for ample track clearance as well as eliminating objectionable sound and vibration is a real achievement in design coordination. And in addition to the power plant, these cars carry complete, ACF designed, air conditioning equipment. The cars measure 76′ from pilot to pilot, 54′ between truck center lines and weigh 78,000 lbs. equipped for the road. Seating capacity for 80 passengers is provided in two compartments which are separated by glass enclosed vestibules. Entrance is made at the center from either side through air operated doors. A crew of two is required to operate the car.

The Susquehanna color scheme gives these new cars a striking appearance. Soft maroon is used from bottom to belt, gray above the belt with a chromium parting strip and shining silver on the roof. This forward step by the Susquehanna line is certain to be well received by those who will appreciate fast, comfortable transportation daily to and from the heart of New York.



Two views of the four Diesel electric generating sets at Newfoundland Airport.

NEWFOUNDLAND AIRPORT

By DWIGHT ROBISON

THE gigantic western terminus for trans-Atlantic flights, via the northern route, sprawls in the midst of rocky land, dense with thick underbrush and trees. More than 1,300,000 cubic yards of dirt and rock had to be moved during the construction of the three great runways, largest of which is approximately 3.4 miles long and 1200 feet wide.

Although the terrain is unusually ill-suited for a project such as this, and the spot is far from any existing civilization or power line, Cobbs Camp in Newfoundland offered a year-round fog-free zone, inland from the sea, and this was a primary requisite in the choice of a location. During the construction period, supplies and equipment were brought along a narrow gauge railroad from St. John's which was then the only method of transportation available to the spot. Now regular air service is maintained. Completed in 1938, and in operation since that time, the port has come to be recognized as one of the finest aerodromes in the world. It is equipped with the most modern machine shops, wireless facilities, telephones and lighting systems.

To carry the electrical load, the Newfoundland Airport installed four Caterpillar Diesel V-8 engines, directly coupled to General Electric 80 kw., 50 cycle, 400 v., 3-phase, 750 rpm. generators. They have had previous satisfactory experience with this form of power, having owned several other engines which were installed and are still powering crushing plants, breaking rock for runway construction and maintenance. Diesel engined tractors, shovels, and other equipment had also done all the dirt moving during the building of the port.

Because of the fluctuations in load, and the exacting requirements of the wireless, a very steady frequency is demanded, and two engines are generally run at a time. They operate on a 24 hour shift, and then the remaining two engines are cut in and the first two cut out.

The fuel consumption for the plant averages about 2¾ Imperial gallons an hour per engine. Lubricating oil used runs about ½ gallon a day for each engine. This oil is changed after each 150 hours of operation, and the engines are flushed out while the Purolators are cleaned.

M.S. "Sea Witch" going out on her builder's trials off Tampa, Fla.

TRIAL OF THE "SEA WITCH"

By REX W. WADMAN

TAMPA, Florida, July 23rd. And it was a trial! When these Maritime Commission fellows get through with an official trial, the ship, its builders, and its crew know it—and how! There is a splendid air of competence, of thoroughness about the way the Maritime Commission and its staff have handled this huge program to date. Ship after ship has been built, tested, and immediately placed into service, with the minimum of red tape, the minimum of delay —and they are good ships, ships which will pay their way against any and all competition.

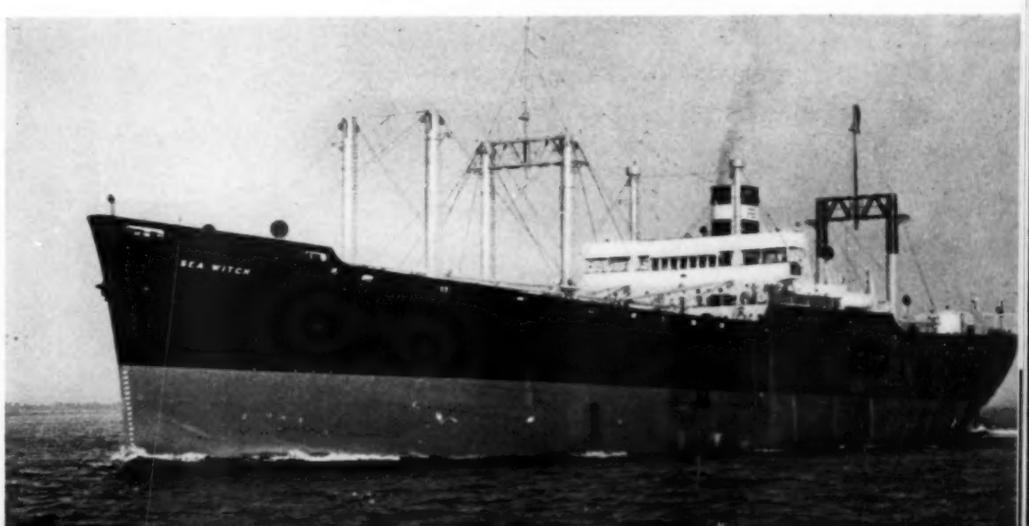
The *Sea Witch* is one of them. She came back into port here this afternoon after successfully passing through her official trials off Florida's West Coast. Now she is ready to go into the service of her new owners, the American Pioneer Lines of Boston, a subsidiary of the United States Lines. She has been assigned to the Far East trade.

The *Sea Witch* combines a number of firsts: She was the first vessel to be contracted for by the Maritime Commission, although not the first to be completed. She is the first big ship to be built in Tampa in nineteen years. Twenty years ago Tampa was a shipbuilding center. It's well on its way to becoming so again.

The *Sea Witch* is the first vessel of this new merchant marine of ours to be equipped with Nordberg Diesel engines and also the first vessel in this program to use Hydraulic Couplings.

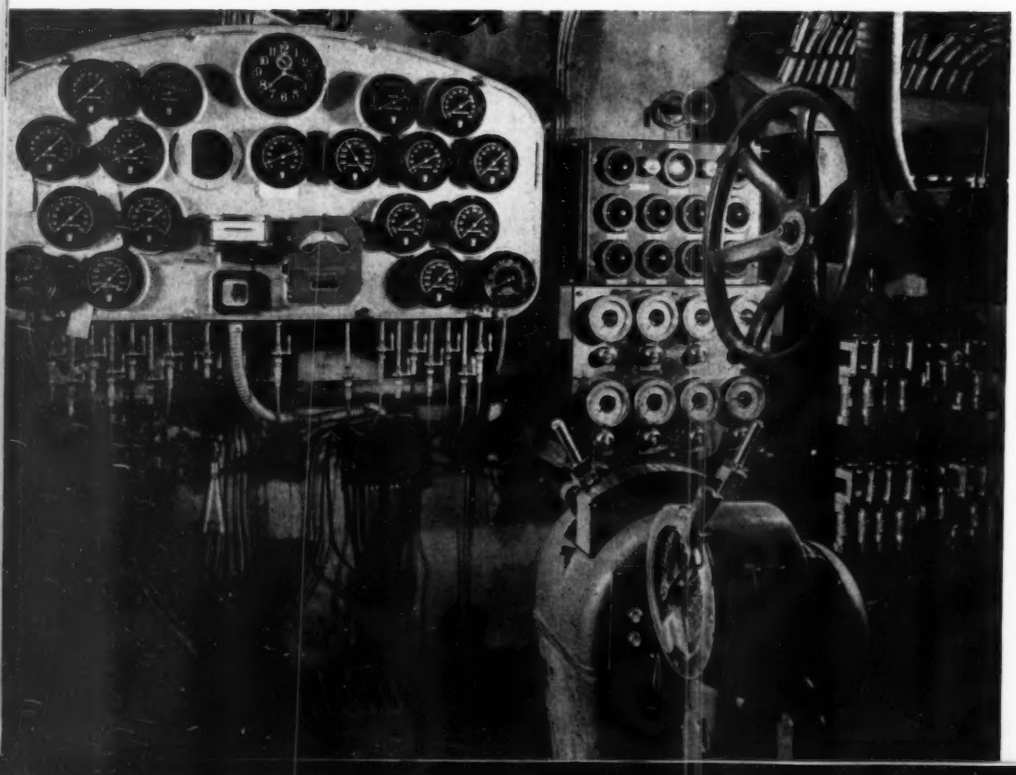
There has been quite a serious delay in getting the *Sea Witch* ready for her trials. The Tampa Shipbuilding & Engineering Company, when they obtained their first contract for four of these C-2 ships, were faced with the problem of, in effect, creating a new and much enlarged shipyard, of obtaining and training a large force of expert workmen. All of this has taken time, a lot more time than was originally estimated. Many a headache, many a heartache, but to Ernest Kreher, President of the yard and

M.S. "Sea Witch," the first of eight Nordberg powered motorships to come out of the yards of the Tampa Shipbuilding & Engineering Co.



Looking down the main alley towards the control board. Note individual Bosch fuel pumps, duplex Nugent filters, and Manzel lubricators.

Control station for both main engines, with instrument panel in background and switchboard to the right.



his able General Manager, Philip B. Brill, goes the credit of having surmounted all obstacles and having completed their first ship. A good ship, well built, well outfitted, a credit to them and to the workmen who built her. A credit to the Maritime Commission, their designers, and technicians. The *Sea Witch*, during the past forty-eight hours of rigid tests has proven herself able to take it and able to dish it out.

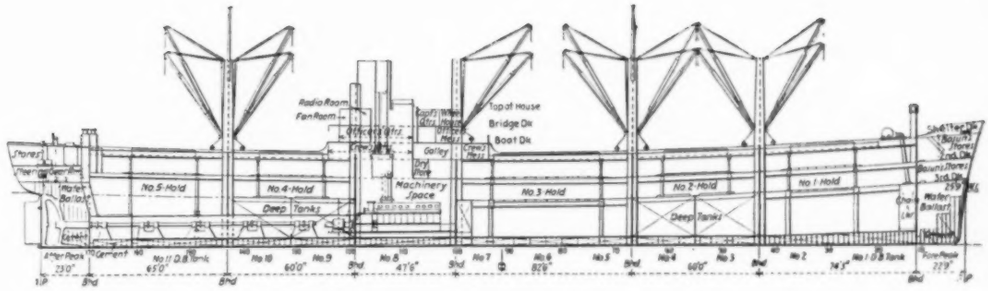
With the first vessel successfully completed and accepted, the Tampa Shipbuilding & Engineering Company is now set up to move right along with its big program. They now have contracts for seven more vessels of this same general type. One is in the water and is being outfitted now. Three more are on the ways, rapidly taking form. 1800 men are working strenuously and efficiently to complete this sixteen million dollar contract in the hope (and I don't think they'll be disappointed) of obtaining more and even larger contracts. They build a good ship here. With a few necessary additions to the crane and handling equipment, they will have

here a fine, new shipyard capable of building good ships quickly and efficiently. And it's a good thing for our country to have a few efficient shipyards situated away from the large industrial areas of the Northeastern section.

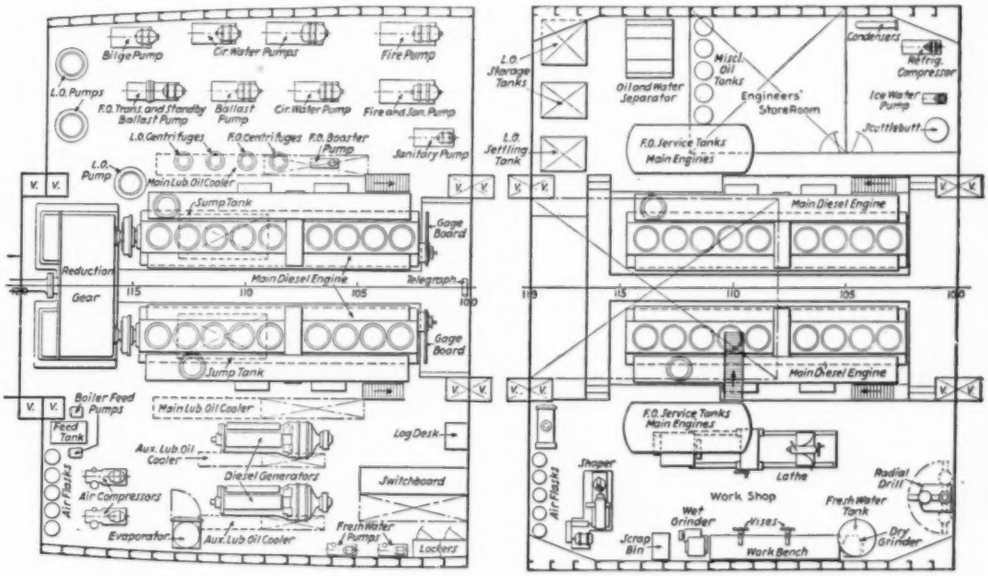
Technically, the *Sea Witch* is of the C-2 type: length 453′; molded breadth 63′; molded depth at side 40½′; displacement 13,900 tons; dead weight 8,760 tons; rated speed 15½ knots. The two Nordberg Diesels deliver their normal 6000 shp. to the propeller at 225 rpm. but are designed and have been successfully tested to deliver 10% of this power continuously when needed and 25% of rated power for short periods. Actual speed on trials 18.4 knots.

These Nordberg Diesels are conventional in all principle characteristics: they are of the crosshead construction, two-cycle, mechanical injection, direct reversing type. Each unit has nine cylinders, 21″ bore, 29″ stroke. As installed in the ship, each engine drives into a Falk reduction gear through Hydraulic Couplings and out to one propeller, the speed of which is 92 rpm. at 225 rpm. of the engines. The slip in the Hydraulic Couplings is some 3% and the friction loss in the reduction gear set is 1½% to 2%, resulting in an over-all efficiency from engines to propeller shaft of slightly better than 95%, which means each engine delivers normally 3155 bhp. at 225 rpm. At 10% overload, 3470 bhp. is developed at an engine speed of 232½ rpm. and at 25% overload, 3950 bhp. is developed at 242½ rpm. A detailed description of this engine appears in Volume Five of the Diesel Engine Catalog. The principal accessories used on the two Nordbergs are Nugent filters; American Bearings for both main and connecting rod bearings; Sealed Power piston rings; Erie crankshafts; Bosch fuel pumps and injection nozzles; Manzel lubricators; and Roots-Connersville scavenging blowers.

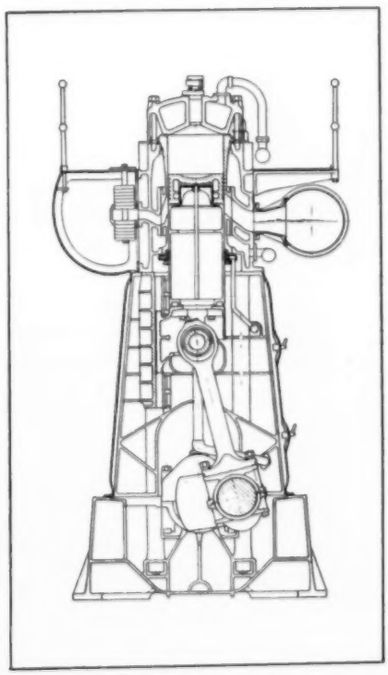
Of course, the feature which interested most everybody on this trial trip was the operation of the Hydraulic Couplings, which were supplied by the Hydraulic Coupling Division of the American Blower Company. Possibly if I quote the remarks of Bill Abbott, the highly articulate staff writer for the *Tampa Tribune*, you will get the reactions of the people aboard better than I can give them to you: ". . . Capt. W. J. Drummond swung his telegraph on the



Section through the M.S. "Sea Witch" which splendidly illustrates the small amount of space occupied by the Diesel power plant, which automatically increases the cargo capacity of these C-2 motorships.

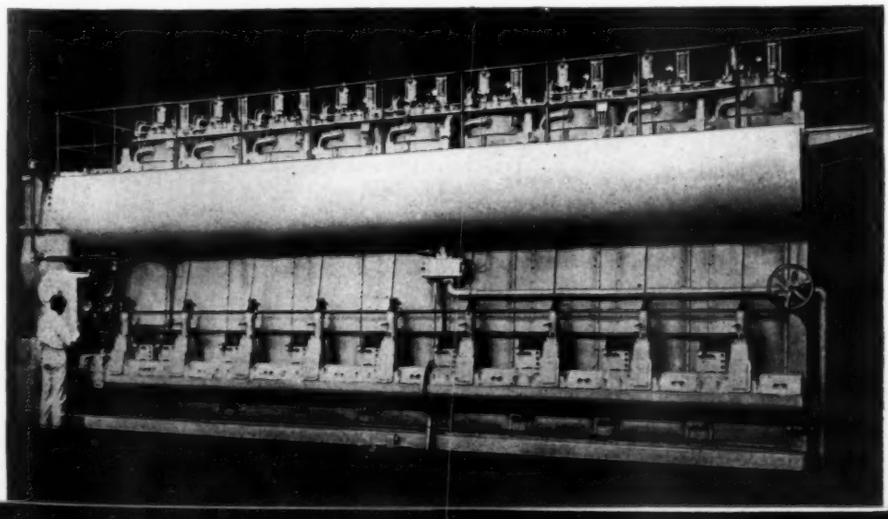


The general arrangement of the machinery aboard the M.S. "Sea Witch" showing both the upper and lower engine room flats.



Cross section of the Nordberg Diesels as installed in the M.S. "Sea Witch."

One of the nine cylinder, BV″ x BT″ Nordberg Diesels developing 3155 hp. at 225 rpm. installed in the M.S. "Sea Witch."



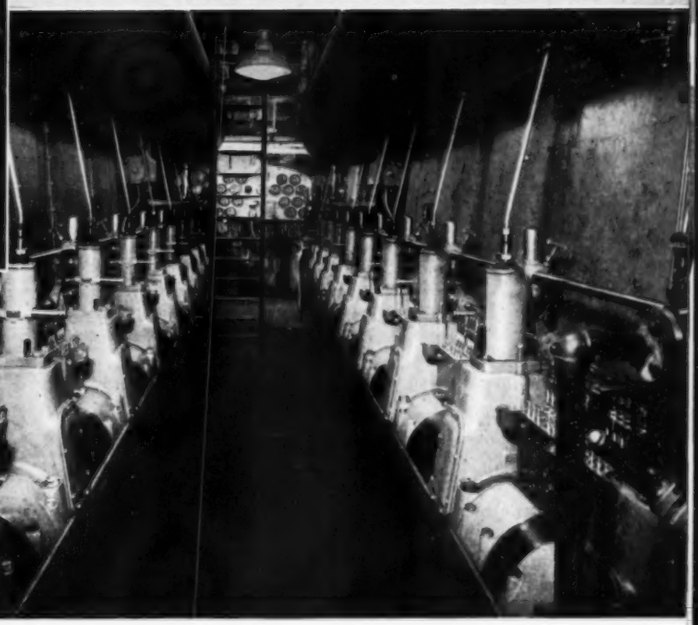
Another SEA WITCH

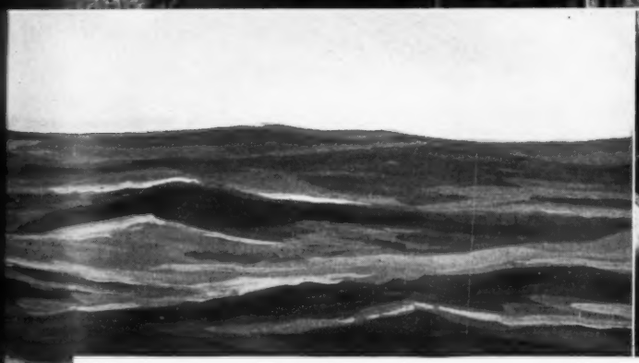
Ninety-six years ago, the SEA WITCH, a famous clipper ship of its day, set an all-time record of 77 days in bringing a cargo of tea from Canton to New York. Those were the days when American Clippers ruled the seas and records set by this vessel still stand for sailing ships. This ocean greyhound, the exploits of which won an all-time place among outstanding ships flying the American Flag, is kept alive by another SEA WITCH, a modern motorship that has just completed its successful sea trials. This latest addition to America's Merchant Marine is a C2 cargo vessel built by the Tampa Shipbuilding and Engineering Company for the United States Maritime Commission. It is propelled by two 3000 shaft horsepower Nordberg Diesel Engines and is one of eight ships of this class for which a total of sixteen Nordberg Engines of this same size are being used.

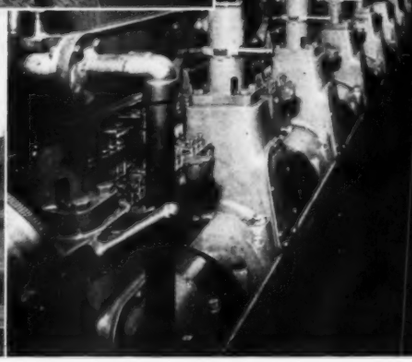
NORDBERG MFG. CO. • *Milwaukee, Wis.*

NORDBERG MARINE

H Sails the Seas



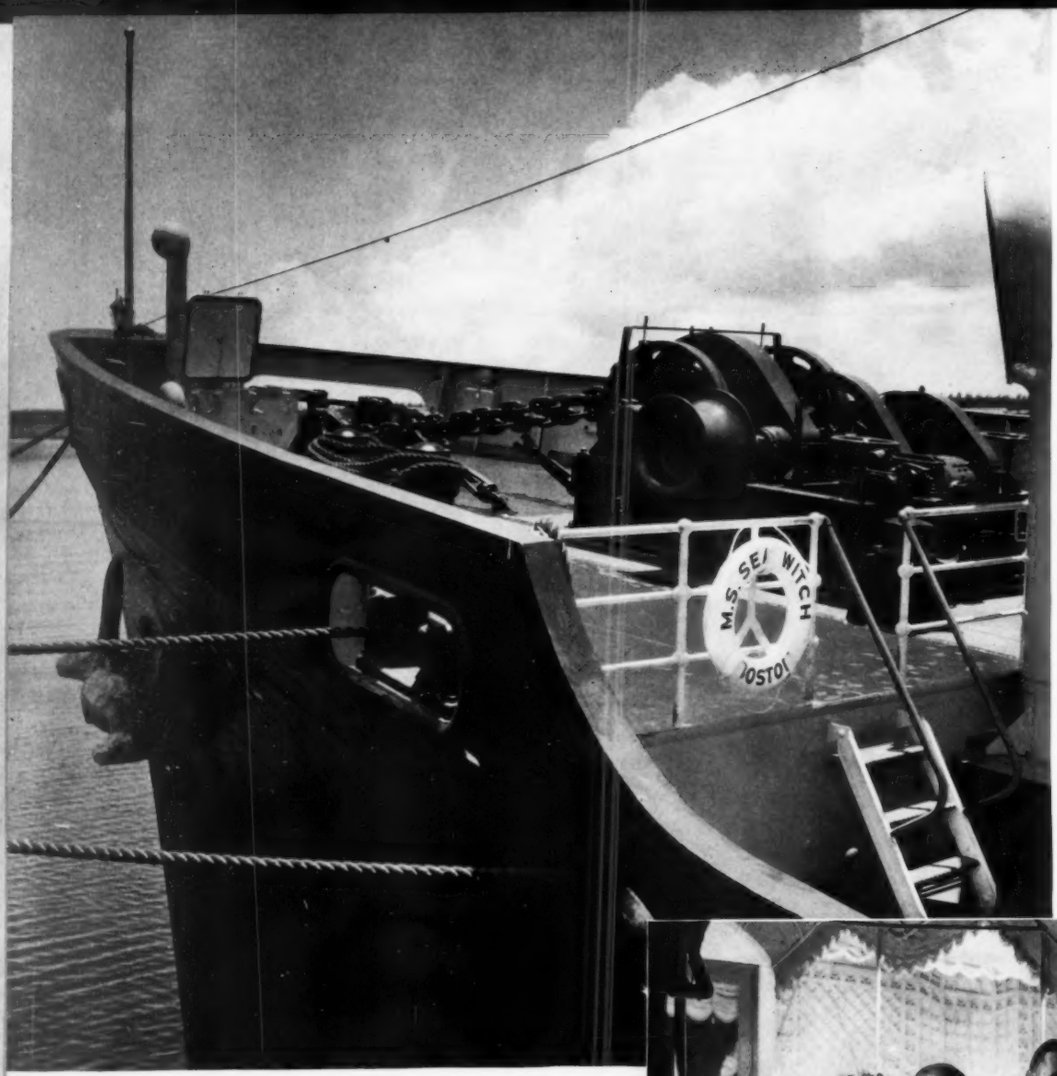




These nine cylinder, two-cycle, direct reversible Nordberg engines are of 21 inch bore and 29 inch stroke, constructed with crossheads and operate at 225 R.P.M. They are connected through hydraulic couplings to a single reduction gear set and drive the propeller at 92 R.P.M. Throughout the design, every attention has been given to provide accessibility and simplicity to assure of greater convenience in operation and easy care of the engines. Large aluminum covers set between the framing, easily handled by one man, allow ready access and ample working space for the care of main and crank-pin bearings, crossheads and other internal parts.

The view along the cylinder heads shows the extreme simplicity of these parts and the freedom from operating mechanisms. The fuel pumps are readily accessible from the passageway between the engines. Both units are controlled from the central control stand located in front of the gauge board. These are but a few of the conveniences which operators appreciate and which add to the operating qualities of Nordberg Diesels.

E DIESEL ENGINES



most important of all they give a slipping clutch effect in throwing the engine load onto the shaft and taking it off again. With these couplings between the engines and the propeller shaft, the load is eased on and eased off, automatically, simply and very efficiently. On top of that, by emptying the oil out of either coupling (and that can be done in almost a split second and easily), either engine can be completely disconnected from the driven shaft and the other engine continue its work. This is highly important in case of operating the vessel at substantially less than rated speed, thus saving fuel consumption, and in case of needed maintenance work on either engine.

All in all, the *Sea Witch* is all right. Some of us came down here wondering about the workmanship and a lot of things. We didn't need to. She measures up to all standards very well indeed; in fact, on her welding for instance, she's tops and she sure does perform.

I failed to mention earlier that the auxiliary engines are Superiors, a pair of them rated at 450 hp. apiece and direct connected to 300 kw. Westinghouse generators.

bridge to full speed ahead, then, while the ship ploughed forward came the order, 'full speed astern.' The *Witch* shivered, danced for an instant like a fighting tarpon, and then responded beautifully. Grizzled old salts swallowed lumps in their throats. And if you don't think a 'crash stop' is something, try it on your automobile—full speed forward and then backward. If a ship can stand up to that, it can stand the fiercest typhoon that ever blew. The *Sea Witch*—the made-in-Tampa boat—did it without the slightest hesitation."

Well, that's a combination of a splendid and simple set of controls on the Nordbergs and the inherent qualities of a Hydraulic Coupling. The net of it is the couplings do their job very well indeed. They cancel out the shock loads of the engines to the reduction gears, yes, but,

Group photograph taken at Tampa Terrace on July 21 just before the trials of the "Sea Witch" started. Front row: Rex W. Wadman, DIESEL PROGRESS; J. E. Schmeltzer, Arthur Rohn, and Com. Glenn H. Easton of the Maritime Commission. Second row: J. W. Gray, Tampa Ship; F. J. Cuneen, Nordberg Washington Manager; Robert E. Friend, President of Nordberg; and Arthur Tode, Propeller Club prexy. Third row: Emil Grieshaber, Chief Engineer, Nordberg; R. W. Bayerlein, Nordberg Sales Manager; H. W. Dow, Nordberg Sales Engineer; A. R. McMullin, Nordberg New York Manager. Fourth row: J. Santshi, John Kuehn, and Bill Johnson, all of Nordberg's technical staff.

The new Cummins Diesel-powered Stutz fire truck owned by the City of Columbus, Indiana. This is the first Diesel fire truck in America. Lower right, Chief Kailor, right talks about his new Diesel fire truck with one of his men.

Report on
DIESEL FIRE TRUCK

By JAMES D KAILOR*

ALL factors considered, the heart of any fire fighting unit is its power. It was for this reason that we gave particular attention to engines when laying out specifications for our latest pumping unit. The fact that we chose Diesel has proved wise, as tests have shown it to be more dependable, more powerful.

Our new Diesel fire truck, first in the United States, was built by The New Stutz Fire Apparatus Company, Inc., Hartford City, Indiana. The specially built unit is a Model "F-D" triple combination pumper equipped with a Cummins Dependable Diesel. The Diesel is a Model LH-600, 6 cylinder, bore 4⅞", stroke 6". At 1800 rpm., 150 hp. is developed and at 2200 rpm., 175 hp. is developed.

The record of the tests to which the pumper was put by the National Board of Fire Underwriters is interesting. Tests were conducted at Blue Water Lake, Montpelier, Indiana. Lift was five feet. The first test employed two 50-foot lengths of 2½ inch C.R.L. hose siamesed into the nozzle with a two-inch tip. The engine to pump gear ratio used was 2.5 to 1. The Diesel operated at 1,630 rpm. and the pump at 652 rpm.; 1,012 gpm. were discharged at 124 lbs. net pressure for six hours.

The second test used 50 feet of 2½-inch C.R.L. hose into nozzle with a 1½ inch tip; discharge gate throttled. Using a gear ratio of 4.425 to 1, the Diesel was operated at 1,664 rpm. and the pump at 376 rpm. At a net pressure of 206 pounds, 519 gmp. were discharged for three hours.

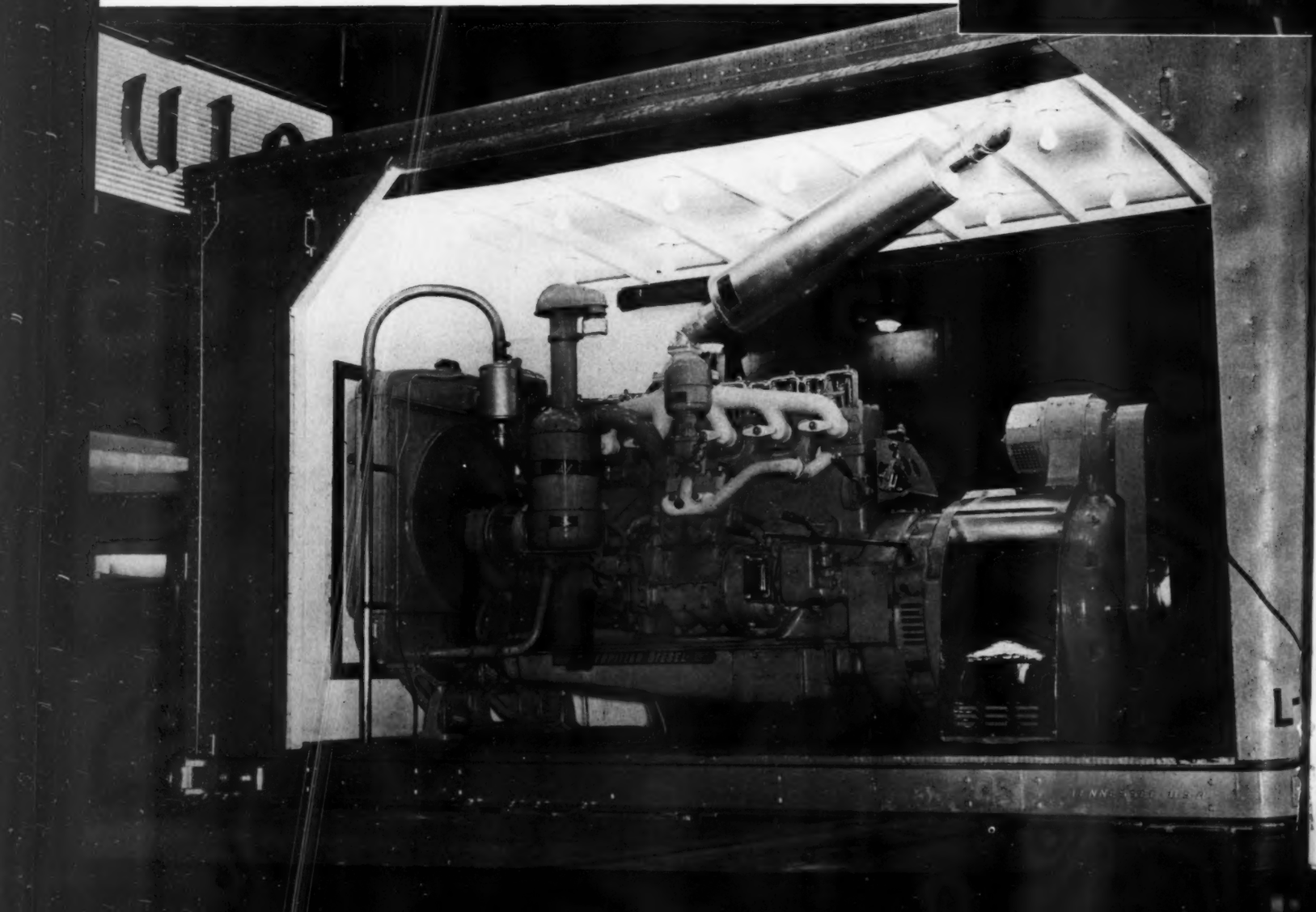
The third test used 50 feet of 2½ inch C.R.L. hose into nozzle with a 1⅛ inch tip; discharge gate throttled. As in the second test the 4.425 to 1 gear ratio was used. The Diesel operated at 1,180 rpm. and the pump at 267 rpm. At a net pressure of 255 pounds, 339 gallons per minute were discharged for three hours.

At no time during the twelve hours of testing was additional water added to the Diesel engine radiator closed cooling system. With the Diesel there is no call for extra water in the radiator when pumping as has been the case with gasoline-powered pumpers with which we've had experience. In fact during the test an unsuccessful attempt was made to "burn up" the engine.

The Diesel gives us tremendous savings in operating costs. As an example, one of our gasoline-powered pumpers used 98 gallons of gas costing 14c per gallon during a 12-hour test. It pumped 750 gpm. Comparing this with the Diesel, we found that the Diesel burned 53 gallons of 4c fuel oil for the 12 hour run and pumped 1140 gpm. The Diesel fuel is standard #3 furnace oil.

* Fire Chief, Columbus, Ind.

Lights and power for the World's largest midway—Royal American Shows—are supplied by three 13-66 Caterpillar Diesel Sets, seven D13000 Diesel-driven electric sets and a 34-15 electric set.



LET THERE BE LIGHT!

The Carnivals Dieselize and the Gate does Better – Much Better

THE Amusement Corporation of America, which constitutes four of the nation's biggest traveling expositions, has recently standardized on Caterpillar Diesel-electric power for all of its Midways. There are now nineteen Caterpillar Diesel-electric sets and Caterpillar Diesel-powered generator sets at work providing lights and power for these enormous carnivals.

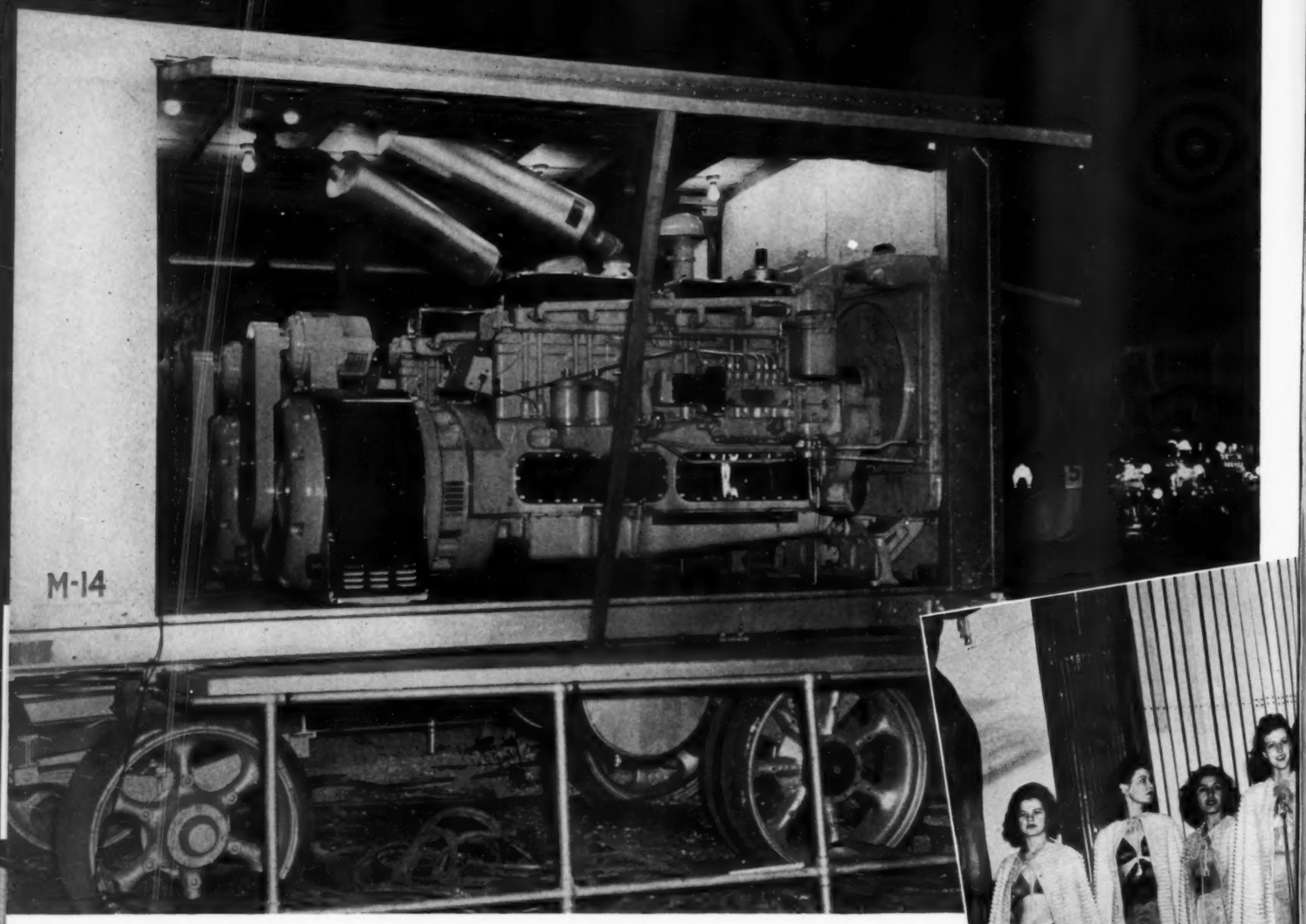
Royal American Exposition started this four years ago with seven experimental units. Due to the satisfaction that these sets gave, they recently installed three new 66 kw. Diesel-electric sets and a 15 kw. Diesel-electric set to provide lights for their troupe train. At the same time, Beckman-Gerety shows and Rubin-Cherry shows installed seven 66 kw. Caterpillar Diesel-electric sets apiece and one 34-15 unit.

Many years ago, carnival engineers knew the advisability of supplying their own power; but there was no available way of generating as much as 600 kilowatts without terrific expense involved, or a transportation problem that simply could not be solved.

Four years ago, however, Royal American Exposition, which is the largest traveling exposition in the world, installed seven Caterpillar Diesel-powered generator sets as an initial experiment in Midway illumination. It was hoped that these portable units would provide an economical way of bringing brighter lights, and at the same time would avoid the dangers of occasional power line break-downs, along with the expensive loss of operating time.

This proved to be the answer that has been sought throughout the entire 2,000 years of carnival history; and according to no less an authority than Carl J. Sedlmayer, President of the Amusement Corporation of America, the portable Diesel plants have brought the entire industry to its peak of human appeal.

If you're a carnival fan, you've probably already noticed the enormous change that has taken place during the past few years. Today any of Amusement Corporation's Midways



Brighter lights and more of them at less cost are provided to Beckmann-Gerety Shows by eight Caterpillar Diesel-Electric Sets. A 34-15 Caterpillar Electric Set, mounted in the diner, provides light for the show train of thirteen Pullman cars.

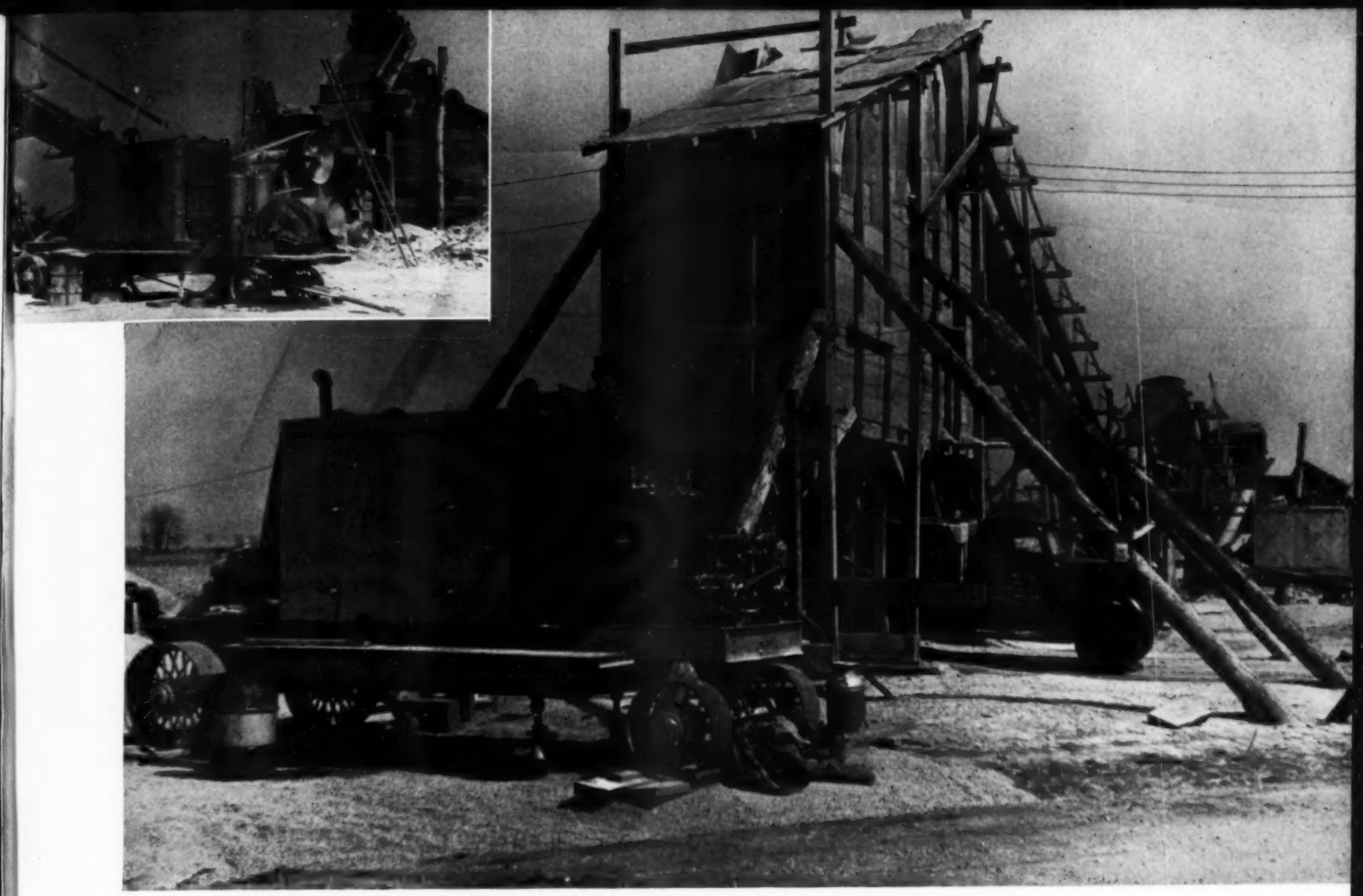
might be transported bodily to a World's Fair and not look out of place. The shiny, colorful, modernistic buildings are brightly lighted from top to bottom. Ferris wheels and thrill rides loop and dip and revolve in a blaze of brilliance. Tall, neon towers shoot up among the concessions to support "spot" and searchlights, keeping the Midways as light as day. Dancers, singers and miscellaneous entertainers work in a blaze of light carrying their amusement to the crowds through the most modern amplifying systems. Theatres as artistic as those on Broadway, house the Parisian, the Hawaiian, the Southern musical shows. Actually, the modern carnival is a traveling city dedicated to the amusement of millions.

When the carnival comes to town, it is an education simply to watch it arrive. The long train of Pullmans and flat cars pulls onto the siding early in the morning. Tractors rumble busily about, unloading wagon after wagon of canvas, materials and tinsel. Faster than seems possible, hundreds of men and women are at work arranging everything for the opening night. Buildings go up like magic, giant ferris wheels appear from nowhere; sturdy gateways and fences grow like mushrooms.

The power plants, under the supervision of electrical genii like Vince Book of Royal American and Dan Fast of Beckmann-Gerety, are hustled down to their appointed places on the Midway. It's only a matter of minutes before the first are running, and power is on hand to ease the job.

Although it seems immensely complicated to the uninitiated eye, the power set-up for these traveling expositions is remarkably simple. Everything needed is on the engine wagon. It is just a matter of connecting wires and digging shallow ditches so that the cables can pass underground back and forth across the Midway. By nightfall, all electricians need to do is flick a maze of switches, and there are searchlights lighting the sky, music blaring, and a general cordial invitation for anyone within range to come around.

How such a revolution in the carnival industry could come about so quickly, and how enormous shows like Royal American could grow even larger and more lavish in a single season hinges around Carl Sedlmayer's first seven engines. The record that these units set up in their first four years of running astonished even the far-sighted Vince Book. They not only solve all the problems set for them but they pay for themselves in power savings.



Two views showing the Cummins Diesel units driving a jaw crusher and conveyor, upper left, and the hammermill, above.

CHURCHILL GRAVEL COMPANY

Diesel Limestone Reducing Plant

AT Pontiac, Illinois, the demand for pulverized limestone for agricultural purposes was so great that Churchill Gravel Company set up a new and highly modern reducing plant for its production. Located a few miles south of Pontiac, this new plant is an addition to the Churchill Gravel Company's quarry near Fairburg, where they have been operating for the past ten years. The operations are unusual in their application of Diesel engines and the entire plant machinery built by the Iowa Manufacturing Company is said to be the first of its kind.

The engines used are Model KP-601 Cummins Diesels which have a 6¾" bore, 9" stroke, 1832 cu. in. displacement producing a peak of 210 hp. at 1000 rpm. The first two engines were purchased when the plant was first set up in October, 1939. The third was put to work in January, 1940, to power the hammermill when the business possibilities of the production of agricultural limestone became fully apparent.

Diesel No. 1 operates at 790 rpm. and powers the jaw crusher and the roll crusher conveyor. Engine No. 2, operating at 900 rpm., powers the roll crusher, the conveyor from the jaw crusher, and the conveyor to the bins. The third unit, running at 800 rpm., powers only the hammermill.

Here are some typical operating costs as given by Mr. E. L. Chesebro, owner of the company: During one period of seventeen working days, when just the first two engines were in use, a total of 12,000 tons of ¾" road stone was produced. In this time, the Diesel on the jaw crusher used an average of 3.9 gallons of fuel per hour costing 6½c per gallon. The Diesel driving the roll crusher used an average of 4.44 gallons of fuel per hour. This gives an average production of approximately 70 tons per hour for a fuel cost of only $0.541 per hour. Total cost including lubricating oil was $0.641. This total operating cost has now been reduced since the installation of dual Deluxe oil filters on each engine which substantially increases the time between oil changes. These figures show a considerable saving over the cost of gasoline power. According to Mr. Chesebro, a 90 hp. gas engine in use at one time costs $1.12 per hour to run. Because of the extremely dusty conditions, precleaners on the Donaldson air purifiers are emptied twice daily and oftener if necessary.

Ralph Chesebro, foreman of the plant, said, "With the Diesels we can run for a week on what it cost to run the gas engine for a day."

Exterior of the Vandalia, Missouri, Municipal Diesel Plant, showing Burgess Exhaust Snubbers with sheet metal housing to provide heat in winter.

VANDALIA, MISSOURI

By LEO. F. KOBERLEIN*

MAY 7, 1939, was an eventful day in the City of Vandalia, Missouri, for that morning the municipal electric generating plant was put into operation and the Power Company disconnected from their local distribution system, which had been purchased by the City.

There had been talk and consideration of a home-owned electric plant at several times in the past, but once the "stage was set", events moved along in rapid order and a plant was acquired without the litigation and delays which are usually experienced in establishing a municipal utility where a privately owned corporation is operating. It seems to us that the utility company officials should be highly commended for their attitude in accepting defeat in Vandalia and cooperating with the City Officials in working out their difficulties, instead of immediately getting involved in litigation and putting up obstacles to delay the City.

Municipal ownership was considered as early as 1932, when the W. A. Fuller Co., Consulting Engineers, St. Louis, Mo., prepared preliminary plans, estimates and a report outlining the feasibility of a plant for Vandalia. No official action was taken, however, and the project was apparently dropped. Those who were far-sighted enough to visualize an electric plant for their City were not idle and through the years did their bit to mould the sentiment and study the advantages of a municipal plant.

Late in 1937, the City Officials decided it was time to put the question of installing a municipal electric plant up to the voters for a decision. The Engineers were called in to study the present conditions and prepare new plans an estimates to replace those submitted in 193 This was done and the Board called an electi to vote on issuing $145,000 in General Oblig tion Bonds. The election was quite vigorou fought by the Missouri Power & Light Co pany but carried on March 1, 1938, by a vo of 960 for and 234 against the bonds.

The Power Company tried several times to g the City to renew its franchise which had r cently expired, but the Officials answered l saying they were not interested. The Pow Company then offered a rate reduction, but t people were assured that the City could opera a plant and give just as low rates for servi as the Power Company could.

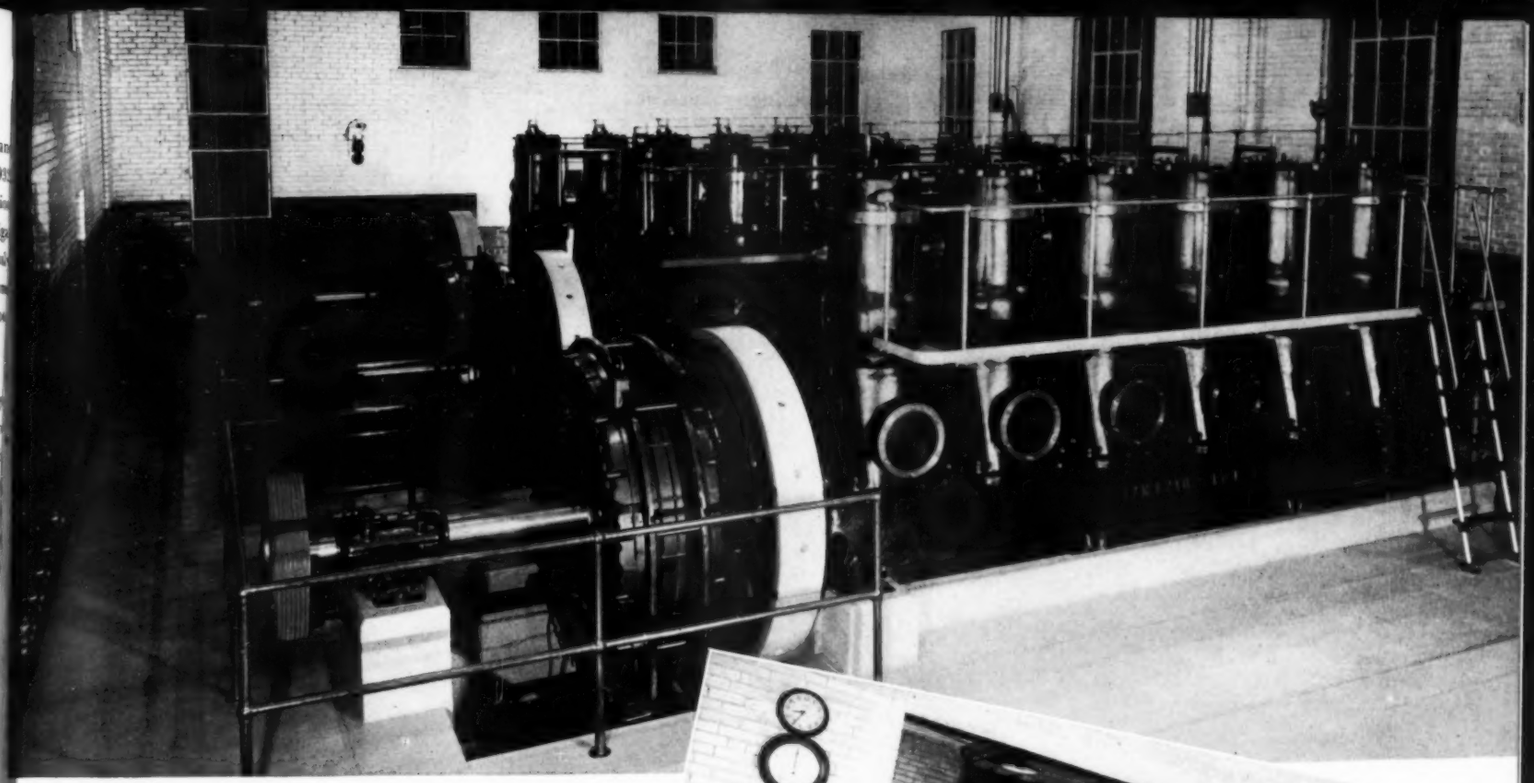
All during the campaign the local citizens an officials were very considerate and courteous t the Power Company Officials and employee but they were nevertheless firm and determine to have a municipal electric plant for Vandali The City Officials repeatedly assured the vote they would try to purchase the distributio system from the Company so as to prever competition and duplication of facilities al to purchase electricity wholesale if this we possible.

After the bond election, the Power Compan officials met with the City Board and Enginee They were emphatic in their statement th they would not consider selling electrici wholesale to the City. It was stated that th would consider selling their local distributio system to the City. They were informed th the City wanted to purchase their distributio system at a fair and reasonable price, but n at the "book value" which the Compan carried it.

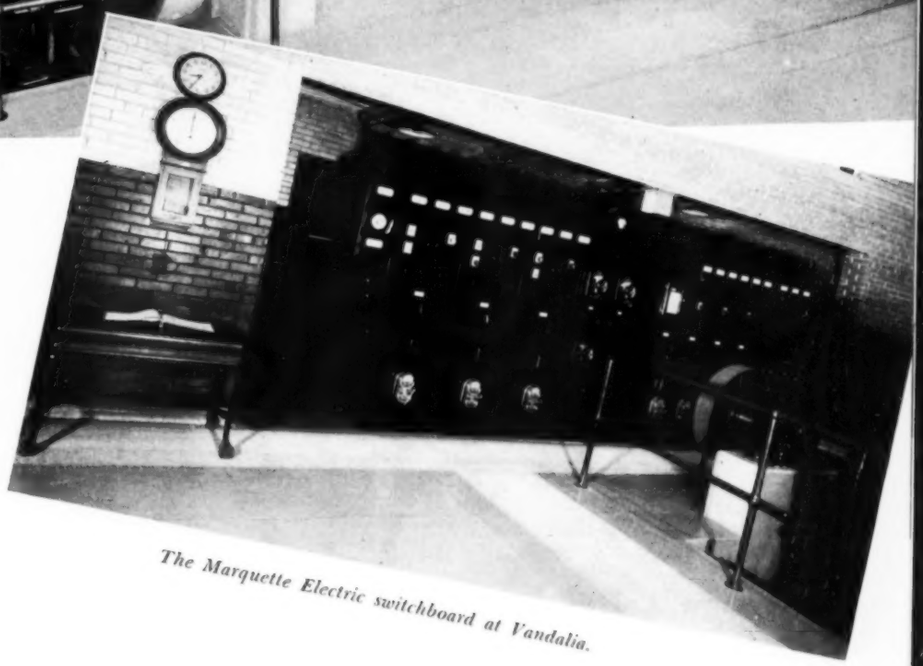
The Company agreed to have its engineers pre pare an appraisal of the distribution systen and the W. A. Fuller Company, Engineers were instructed by the City to make a complet inventory and appraisal of the local system As was to be expected, there was a substanti difference between the amount the Compan wanted for its system and what the City offere to pay. After several conferences, most of the differences were successfully negotiated and t City finally agreed to pay $38,000 for the di tribution system.

During this time, the City made the necessar preparations to issue and sell the bonds to co struct a Diesel engine generating plant an construct a distribution system or purchas that of the Company. When Congress passed

* Engineer W. A. Fuller Co., Consulting Engineers, St. Louis, Mo.



General interior of the Vandalia plant, showing three Fairbanks-Morse Diesels each rated at 450 hp.



The Marquette Electric switchboard at Vandalia.

bill in the spring of 1938 for additional P.W.A. Grant Allotments, the City decided to wait a short time with the project and try to obtain a grant. It was seen that with the help of a grant the City could construct a larger plant and not have to issue all the bonds which had been voted.

A grant allotment of $77,535 was made on July 30, 1938. This, as was the case in all similar allotments, required that the City make an effort to acquire upon reasonable terms and conditions, the facilities of the private utility with which the City would compete. This condition had already been met as the City and Power Company had reached an agreement regarding the purchase of the system. We understand this was one of three projects in the United States where the City reached an agreement with the private utility for the acquisition of their facilities without the assistance of the Public Works Administration, as required by the 1938 P. W. A. Act.

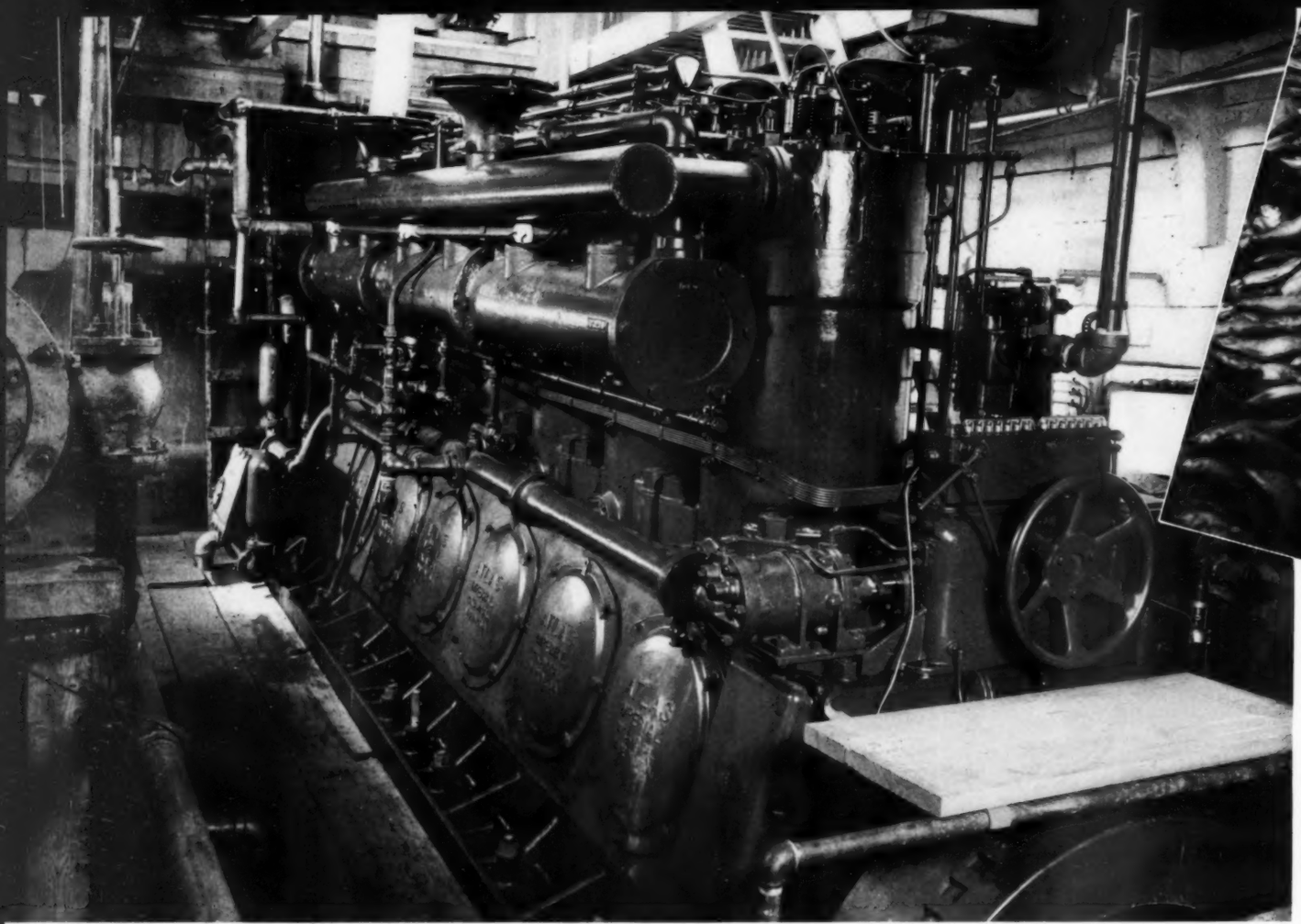
The local conditions at Vandalia are rather unusual for a small generating plant. A manufacturing plant has a peak demand of approximately 110 kw., which is about 40% of the normal peak. Another plant has a 40 hp. and a 25 hp. motor which may be put into operation at any time, so it was necessary to have the engine generating unit amply large to take care of any sudden increase in load or of having to start up a second unit every time the load increased above normal.

Since the City had obtained a large grant allotment and had more than sufficient bonds voted, it was decided to build a three unit plant and have the units large enough to take care of substantial increases in load requirements. One unit takes care of the normal requirements, but the load is already increasing, so a second is often operated in parallel for the peak. This leaves a standby unit at all times.

A new brick and concrete, strictly fireproof power plant building was constructed on the lot adjacent to the municipal water works building. It had a steel deck roof with I-beams, steel joists, and steel sash and doors, so is completely fireproof. The I-beams are set over the engines and used as a trolley beam for chain hoists. A lean-to was constructed on one side of the building to provide space back of the switchboard which was set in an opening of the main wall of the building. This provides ample space back of the switchboard for placing the station transformers, street lighting regulators and other electrical equipment. The office is to the front of the main building in a similarly designed lean-to. The pilasters are of contrasting color and white concrete trim which gives the building a pleasing appearance. The engine room is of sufficient size for installing a fourth Diesel engine unit.

A rather unusual heating system was constructed by putting a sheet metal housing

. . . . *And now please turn to page 57*



Exhaust manifold side of the new Atlas Imperial Diesel (600 hp. at 300 rpm.) recently installed in the Menhaden fishing boat W. I. MESSICK, Reedville, Virginia.

"W. L. MESSICK"

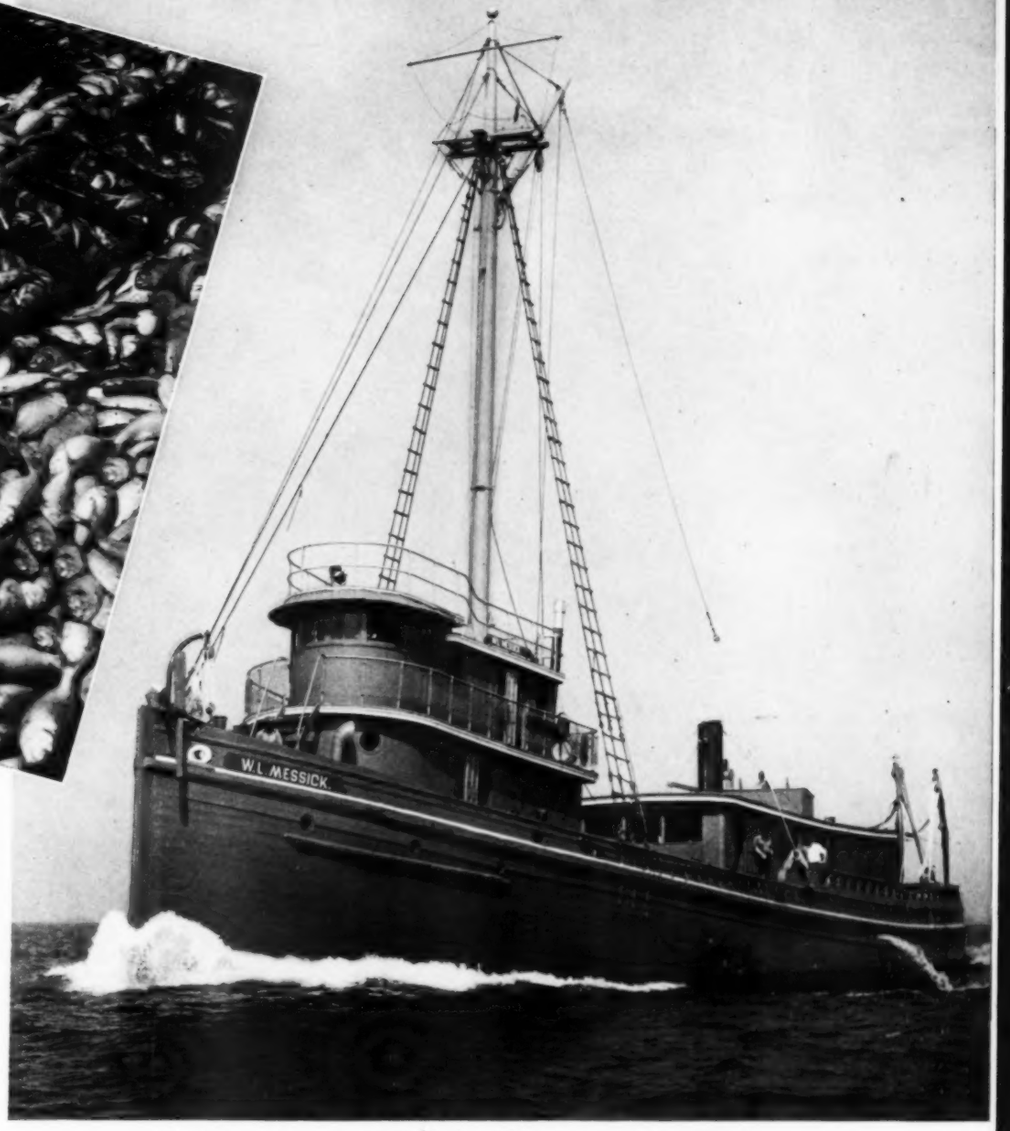
Menhaden Boat Modernized

WHEN a boat requires three-quarters of a ton of coal per hour at six dollars per ton for normal steam operation and the same hull under the same conditions of service can be driven by a Diesel engine with thirty gallons of fuel oil per hour at five cents a gallon, it is simple arithmetic to figure a saving of three dollar for every hour under way. Adding to this the difference in maintenance for a new Diesel and for steam equipment over twenty-nine years old makes a grand total of approximately ten thousand dollars a year of possible savings to the owner, based only upon the relatively short fishing season of five and one-half months. These figures are not theoretical but are taken from the records of a leading Menhaden fishing company on Chesapeake Bay. The Edwards Company, Inc., located at Reedville, Virginia, operate a well-known fleet of "bunker boats", a modern processing plant and their own tanker for transporting crude fish oil to Baltimore for refining. Their recent conversion of the 290 ton *W. L. Messick* should be of particular interest to owners and operators of similar craft and other types of heavy-duty work boats.

Built in 1911, the stout wooden hull of the *Messick* still has many years of profitable service ahead. Her boiler, however, and 600 ihp. compound steam engine reached a point last fall, after twenty-nine years of reliable and profitable use, where maintenance and repair no longer seemed justified, and new propulsion equipment was considered. Of six other company ships in operation at that time, three were Diesel and three were steam, so ample figures were available to judge past performance of both types of power on the impartial basis of equivalent operating conditions. The figures previously quoted showed actual savings in dollars and cents that could be anticipated from conversion.

The new engine is a 6 cylinder Atlas Imperial Diesel rated at 600 hp. at 300 rpm. and was supplied, together with other necessary engine room equipment, by the Fleck Engineering Company of Baltimore. With complete machine shop facilities at the Edwards plant, it was possible for the owners to handle all piping

The W. L. MESSICK in action taking 1200 barrels or approximately 350,000 fish at one setting of the net.

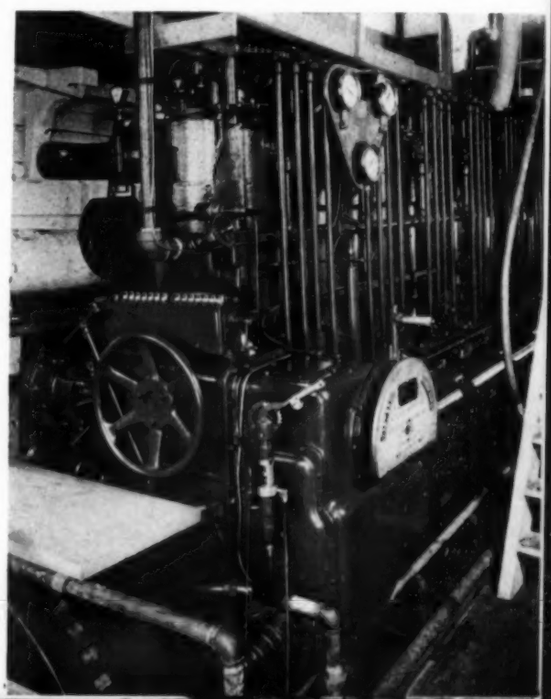


The twenty-nine year old Menhaden fishing boat W. L. MESSICK after conversion to a 600 hp. Atlas Imperial Diesel engine.

and most of the other conversion work, once the new foundation had been constructed at a Norfolk yard. The efficient simplicity of the new engine room results from the self-contained type of engine selected. Auxiliary equipment such as the starting-air compressor, cooling water pump, Alnor exhaust temperature pyrometer, Burgess air filter, Purolator fuel filters and the fuel pump are all engine-mounted. A second-hand condenser was converted into a fresh water cooling system heat exchanger so that the only other auxiliaries necessary were Edison batteries, floating on the line of the tailshaft generator, and a Maxim silencer connected to the exhaust manifold by a section of Penflex flexible metal hose. By welding steel eyes to the silencer shell and fastening it with four stays to the top deck covering the engine room, this unit serves as a stack, both in purpose and appearance. The auxiliary power unit is a very compact assembly of a Curtis compressor, bilge and general service pump and 2 kw. generator, all belt-driven by a single cylinder Stover Diesel. The main engine is directly connected to a Columbian bronze propellor with a 60" pitch and a diameter of 80". The thrust bearing is mounted integrally with the engine, immediately aft of the flywheel. An air ram connected to the control lever provides quick reversing for maximum maneuverability.

Although Menhaden fishing cannot be considered as heavy duty service as barge towing, fifteen to eighteen hours per day operation is demanded during the five-month fishing season and thorough dependability is vital due to the restricted earning period of these ships. This particular vessel has taken as many as 1200 barrels or approximately 350,000 fish at one setting of the net and, with no refrigeration facilities on board, speed also is at a premium for profitable operation. The three cardinal demands of this important industry are speed, economy and dependability, and all three are admirably satisfied by heavy-duty Diesel propulsion. The conversion of the *W. L. Messick* as described illustrates clearly the increasing trend among Menhaden fleet owners to protect hull investments with this type of power when obsolescence of steam equipment forces modernization of propulsion machinery. It is noteworthy, also, that engine room personnel accustomed to steam operation quickly and easily accommodate themselves to Diesel routine.

Control station of the new Atlas Imperial Diesel recently installed in the Menhaden fishing boat W. L. MESSICK.



The Lapham-Brown service station in Brookline, Massachusetts, as it appears from Boylston Street.

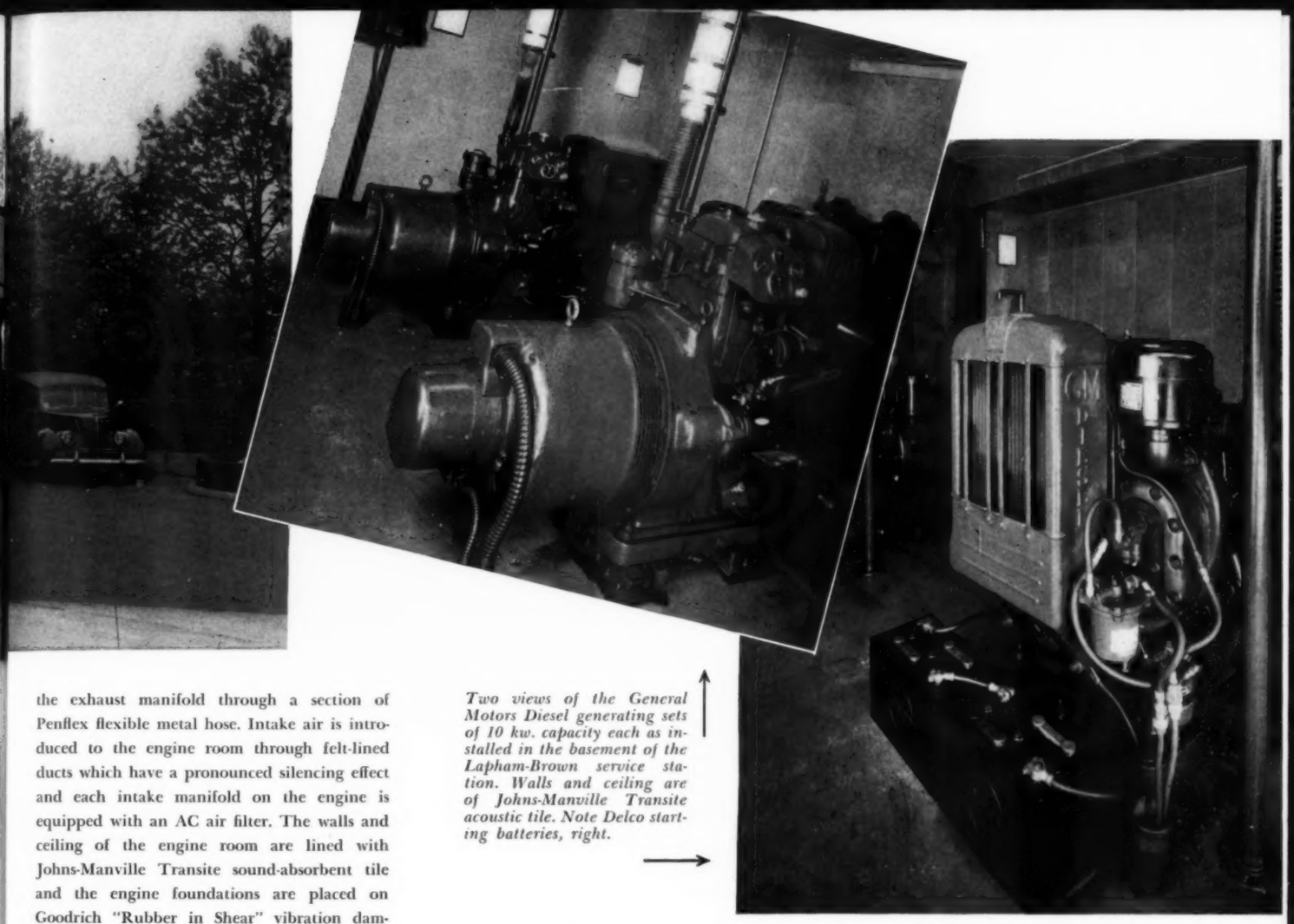
LAPHAM-BROWN OIL CORPORATION

Massachusetts Filling Station Cuts Electric Costs 3¢ a Kilowatt with Diesels

YANKEE thrift and enterprise have long been by-words throughout the country, and, to prove that these twin virtues are still held in high regard by New England businessmen, we offer the solution to the problem of rising power costs recently effected by Lapham-Brown, Inc., at one of their ultra-modern filling stations in Brookline, Massachusetts. Located on the outbound side of Boylston Street, one of Boston's busiest four lane arteries of traffic, this station is ideally situated to serve the thousands who commute daily by motor between the business district and extensive suburbs as well as those travelling this main thoroughfare to southern New England, New York, and points south. From the standpoints of equipment, service and attractive appearance, the owners have made this station second to none in the district and enjoy well-earned success as a result. However, just at the point where others might have been inclined to rest on their laurels and enjoy the fruits of their labors the previously mentioned Yankee thrift and enterprise asserted itself in this organization to make a good business better; to raise high standards even higher and, at the same time, to increase profits through substantial reductions in operating costs. Their initiative in planning, installing and operating their own Diesel generating plant together with the results obtained should be of particular interest to every filling station owner.

When this Lapham-Brown station was first opened in November, 1935, purchased power was used for lighting, battery charging, gasoline pumping and operating air compressors and service floor hoists. The motoring public and particularly women drivers naturally prefer a clean, attractive service station, well lighted at night. Originally, illumination consisted of six flood lights on the service floor of 200 watts each, six flood lights in front of the building on the pump plaza of 500 watts each and a 100 watt lamp in each of the five pump globes. Another vital consideration for the successful station operator is constant availability of light and power. During the hurricane in the fall of 1938, this station along with many others in the district was without electric current for three days with the resultant loss of revenue and inconvenience to customers. By an ingenious arrangement of an old automobile engine, they finally were able to pump gasoline during the latter part of this "blackout," but it was purely an emergency measure and did not result in station lighting so necessary for routine business. As competition in the form of new neighborhood stations increased, the demand for brighter lighting became apparent but involved an increase in operating costs out of proportion to the estimated gain. Thus the demands for more power, less expensive power and an independent source of power resulted in the present Diesel generating plant as illustrated.

The installation was made by the K. B. Noble Company of Hartford, Connecticut and consists of two single cylinder General Motors Diesels directly connected to Delco generators, rated at 10 kw. each at 1200 rpm. These are twin units arranged for radiator cooling and electric starting from Delco batteries. Each engine is equipped with a Maxim silencer connected to

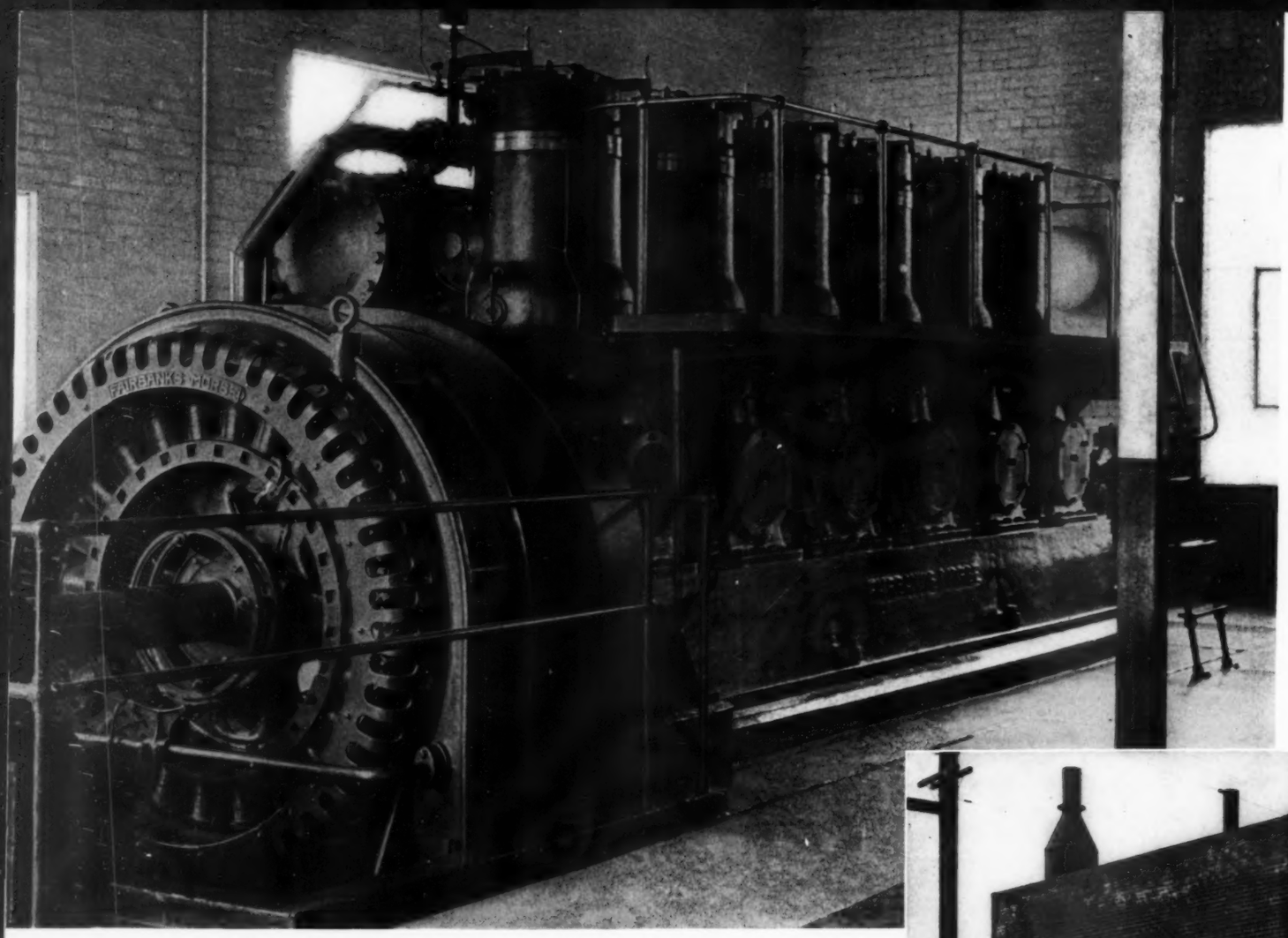


Two views of the General Motors Diesel generating sets of 10 kw. capacity each as installed in the basement of the Lapham-Brown service station. Walls and ceiling are of Johns-Manville Transite acoustic tile. Note Delco starting batteries, right.

the exhaust manifold through a section of Penflex flexible metal hose. Intake air is introduced to the engine room through felt-lined ducts which have a pronounced silencing effect and each intake manifold on the engine is equipped with an AC air filter. The walls and ceiling of the engine room are lined with Johns-Manville Transite sound-absorbent tile and the engine foundations are placed on Goodrich "Rubber in Shear" vibration dampeners. Thus, anyone a short distance away from the engine room cannot tell whether the engines are running or not. Other auxiliary equipment consists of Skinner lubricating oil purifiers, Fulflo fuel filters, both engine-mounted, and a Sprague Power Factor Correction Capacitor on the switchboard. A 3 hp. General Electric motor is direct-connected to an Ingersoll-Rand compressor to supply compressed air to the service floor. Fuel is stored in two 250 gallon tanks, in addition to the 1000 gallon tank for heating oil.

There is no direct labor charge. It is based on part-time service of a regular employee, since no additional personnel was required to operate the engines and very little attention is given them by any of the six regular men on each working shift due to the reliability and simplicity of operation. There is always at least one man on each shift thoroughly qualified to supervise the engine room when necessary. One unit will operate the power equipment of the station with an amply safe load factor, which gives 100 per cent. stand-by service during daylight hours. Both engines are required for full night lighting since the six flood lights on the service floor were immediately increased from 200 to 500 watts each, the six outside flood lights from 500 to 1000 watts each, and the pump lights from 100 to 200 watts each. In addition to the actual operating costs, depreciation of the equipment is charged on the following quarterly basis: engines and generators at $200.00, engine room and installation at $69.61, or a total depreciation charge of $269.61. This brings the total cost of Diesel-generated power to $473.59 a quarter. The estimated cost of purchased power to satisfy the increased lighting demands is $575.00 for the same period, or a saving of over $100.00 even during the amortization period. Obviously, at the end of five years the installation will have paid for itself out of savings and the difference between the cost of Diesel generated power and purchased power will then be approximately $1500.00 a year. In addition, the station is now completely independent of outside power supply and can no longer be affected by power interruptions resulting from storms and similar unavoidable conditions.

It is not surprising to find such a progressive policy followed by this company. The accompanying illustrations show the thoroughly modern equipment throughout this station. Civic-minded Bostonians have asserted for years that Brookline, virtually a residential section of Boston, is the wealthiest town in the world per capita and the beautiful homes surrounded by well-kept grounds serve to justify such a claim. In addition, it would seem that the residents of this community are extremely critical of values since property assessments have been reduced by $8,000,000 this year, and the tax rates lowered substantially. Also, they have retained the old New England town-meeting form of government where public questions are openly debated to the benefit of all. In this type of community, it is not surprising, therefore, to find the benefits of Diesel-generating power critically analyzed and accepted as a logical means of reducing operating costs, improving service to the public and increasing profits. Although few motorists realize the change in power source at this station, it is of major importance to the owners and, as in any business, when operating costs are reduced the public benefits. This up-to-date filling station is representative of the trend to Diesels throughout the country.



View of the 450 hp. Fairbanks-Morse Diesel, 14" x 17" at 300 RPM., installed in 1939.

SAN AUGUSTINE, TEXAS

By A. V. REITER

OF THE many towns in the vast state of Texas, San Augustine, in the pine woods of the deep east section, is one of the most interesting. Its Spanish mission of 1717 was already a landmark along the old "Camino Real", or King's Highway, before it became the first Texan town to incorporate under the influx of Anglo settlers. Since then San Augustine has been a town of many firsts, and has played an important role in keeping apace with the progressing times. Today it owns the largest municipal plant per capita in Texas.

San Augustine's largest industry is the production of power from 1410 hp. in Diesel generating equipment owned by its present census of 1519 persons. Growth in horsepower at the municipal light plant on first glance seems phenomenal, but it is a real result of the farsightedness of the city officials. This foresight has recently culminated in San Augustine making itself the headquarters of the Deep East Texas Electric Coop. serving five counties with San Augustine as the geographical and power distribution center.

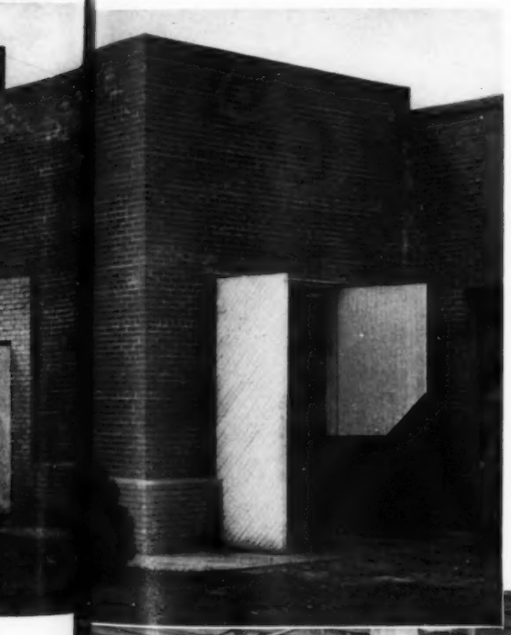
Beginning in 1921, the history of municipal ownership of utilities at San Augustine has been one of consistent growth and increased income at lower operating cost. From the first two engines in the plant—one 25 hp. horizontal Fairbanks-Morse oil engine, and one 75 hp. Fairbanks-Morse hothead semi-Diesel—the industry has grown throughout its nineteen years until today the municipal plant consists of 1410 hp. of the most modern equipment. As an example of the progressive development, the following comparative figures for the years

1938 and 1939, which show great strides, are typical:

	1938	*1939*
Kw generated	482,500	753,885
Gross Receipts	$18,811.11	$26,543.65
Gross Profits	$10,838.50	$14,059.80
Charge for Street Lighting	none	none
Charge for Water Pumping	none	none
Cost per KW for Fuel and Lube Oil	$.00608	$.00476
Peak Load KW	225	310
Number of Meters ..	293	424

It is a known fact that the increase of available power presented the city with the opportunity to solicit more customers and to encourage the use of electricity. It is obvious, too, that the modern and more efficient equipment and better load factor have shown marked savings with a reduction of fuel and lubricating costs (per KW amounting to $0.00132) to less than 5 mills per kwh.

Exterior view of San Augustine, Texas, Municipal Light and Power plant.



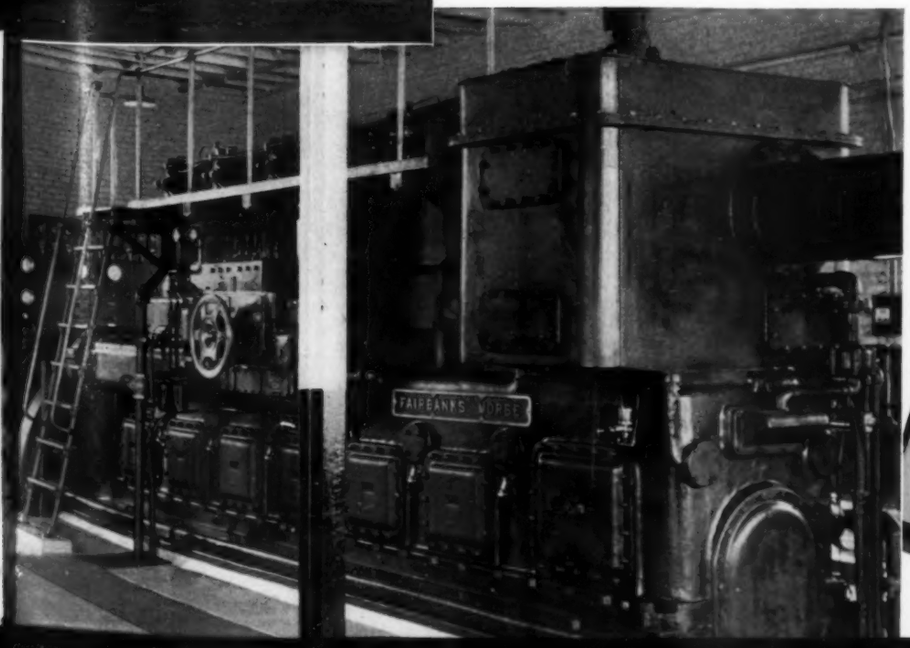
The city officials have never failed to realize the potential paying power of their industry. To increase its possibilities, they turned to the large REA district of which their city is the geographical center. The Deep East Texas Eleetric Coop., just organized, was using San Augustine as temporary company headquarters for their several crews of men and their families, and buying a small amount of power from San Augustine. However, the REA considered contracting for its current from privately-owned utility companies, since at that time the plant at San Augustine was not adequately powered to serve the entire REA project.

San Augustine considered the situation and determined to secure the entire load of the vast area, not only for the revenue to be derived from the plant, but also from the REA customers coming to San Augustine who would do business with the merchants while they were in the city.

The city then contracted to sell REA all of their current requirements at a most attractive wholesale rate. To handle the additional load, it was necessary to install in the plant further Diesel generating equipment. San Augustine contracted in January, 1940, to purchase a 720 hp., Model 33 D14 Fairbanks-Morse Diesel generating unit.

The REA load at present amounts to 30,000 kw. per month. On the present 250 miles of line using the current, REA serves 525 customers. The city light plant still has an excess of available power with standby, and by the time it has interlocked the full 650 miles of REA lines, as is expected, there will be an approximate total of 2000 REA customers using current from the San Augustine, Texas, municipal light plant.

View of operating side of the 720 hp. Fairbanks-Morse Diesel.



The counties served from the network of REA lines branching from San Augustine as a focal point include San Augustine, Nacogdoches, Shelby, Sabine, and Newton Counties.

The entire well-balanced and efficient plant is most impressive. It is equipped with the following Diesel generating units:

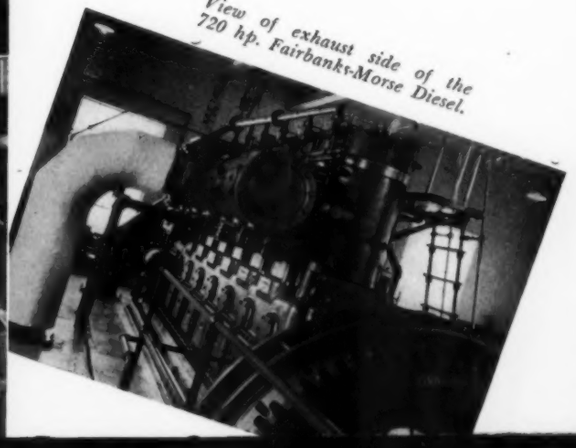
One 240 hp., 14" by 17" Model 32 F-M Diesel, One 450 hp., 14" by 17" Model 32 F-M Diesel, One 720 hp., 14" by 17" Model 33 F-M Diesel, all direct-connected to F-M alternators.

The plant maintenance is supervised by Mr. Troy Mitchell, Manager of Utilities, to whom much credit is due, as well as to the efficiency and interest of the mayor and city council.

It is interesting to note that Nugent fuel oil filters and Youngstown Miller lubricating oil purifiers are used by the plant to secure high efficiency. The new 720 hp. Diesel has oil-cooled pistons and uses a Sims shell and tube oil cooler. The switchboard manufactured by General Electric is different in that a center panel is equipped with all lubricating and water gauges made by Marshalltown. On the engine control panel is a 17 point Alnor pyrometer which serves all engines. The 720 hp. engine is equipped with a Burgess exhaust silencer. The 450 hp. engine is protected with an American OCH air filter. The 720 hp. unit receives its scavenging air through a Burgess air filter.

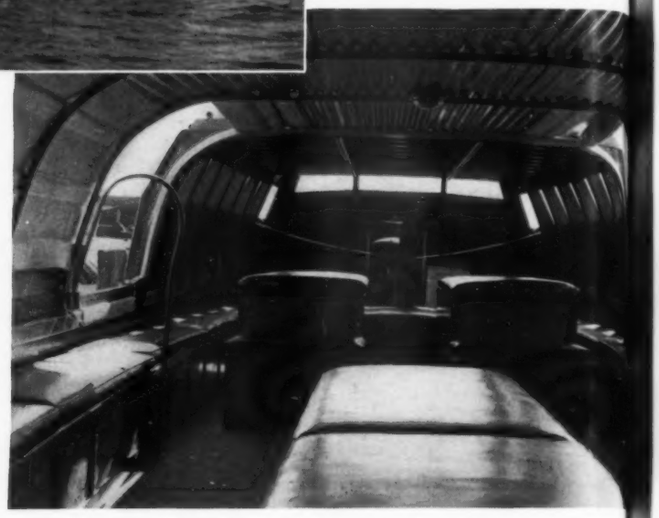
A new cooling tower manufactured by the Water Cooling Equipment Corporation serves the entire plant. The Crane water and oil piping and valves are neatly and adequately installed. On the REA lines, all transformers, lightning arrestors, and meters are made by General Electric Company.

View of exhaust side of the 720 hp. Fairbanks-Morse Diesel.



This unique, Diesel-propelled water taxi and utility workboat makes 15 knots.

View looking forward in the deckhouse. Seats for 85 persons are provided along sides, in center and over engines.



WORRIER VII

By A. W. PONSFORD

"WORRIER VII," claimed by her builder, Ira B. Pevoto, who has built everything from windjammers to tuna clippers, and her owner, Capt. W. A. Hoss, as the most advanced water taxi and utility workboat in American waters, has been placed in service at San Diego, California.

This $15,000 fifteen knot vessel operates in ship-to-shore transportation service and this summer will be employed in the private charter trade for marlin swordfish and live bait angling offshore.

The round bottom hull is 47 ft. long, beam 12 ft. Bulwarks are higher than ordinary in this type of boat to make her drier for ocean service. Frames of bent oak are 1¾ in. by 2 in., 9 in. on centers.

The hull is strengthened by bent oak floor timbers to the bilge line; stern is reinforced with steel knees, with watertight bulkhead forward. Planking is Oregon pine and the cabin and all trimming mahogany. Teak, ⅞ in. by 2 in., was used for decking.

The pair of 125 hp. Cummins Diesels in the Worrier VII.

Arrangement of the superstructure is a novel innovation, never before employed in passenger workboat building. The deckhouse extends almost to amidships, with forward windows sloping sharply for better visibility. Steering wheel and engine controls are on a raised platform, with the pilot's cushioned seat in the center.

The stern superstructure is of moulded galvanized iron, anchored to a framework of channel iron with a similar framework bolted to after end of cabin. Between these are spaced looped stanchions on which, to form the roof, are sheets of corrugated iron. Sides of the after part are made of slatted canvas which can be rolled up and made fast on top in orthodox fashion for fair weather running.

Seating arrangements for a capacity of 85 passengers in ship-to-shore transportation are along the sides, from stern to control platform, over the twin engines, and on the life preserver compartments which center the after deck. Comfortable leather pads, in olive green, cover all seats.

"Worrier VII" is powered with two 125 hp., 6 cyl. HMR Cummins Diesels, turning 1650 rpm. These engines are of new design, and have separate oil coolers. Set forward of amidships, the power plants are mounted on hard rubber blocks.

Twin Disc marine clutches and 2-to-1 reduction gears were chosen by Capt. Hoss (an operator with vast experience in Pacific coast and Florida shoreboat service) to assure 100 percent power in reverse and to give that instant maneuverability so necessary for a twin screw water taxi under crowded harbor conditions. The cooling system is a combination of fresh and salt water. The Diesels are cooled by fresh water, with a special heat exchanger and 12 ft. Monel metal tubes, the system operated by a 1¼ in. engine gear pump. Oil system and exhaust manifolds utilize salt water for cooling, circulated by a 1 in. auxiliary pump. Another innovation here is the use of 5 in. steam hose exhaust pipes, carried aft along the deck to underwater outlets at the stern. These were installed to give greater flexibility.

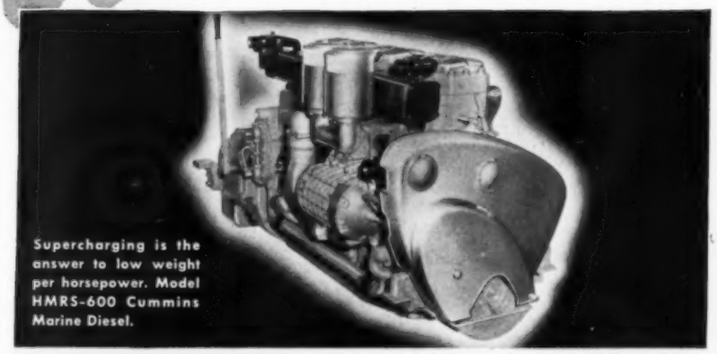
Shaft logs, 10 ft. long, are part of the hull design and carry straight through bottom to the engines. This plan, the builder maintains, adds a great deal to hull strength. The 2 in. Tobin bronze shafts drive 28 in. diameter 26 in. pitch, Hyde wheels. Twin rudders are of bronze, as also are two stern towing bitts.

The Job You Want Done Is *Now* Being Done with CUMMINS Dependable DIESELS

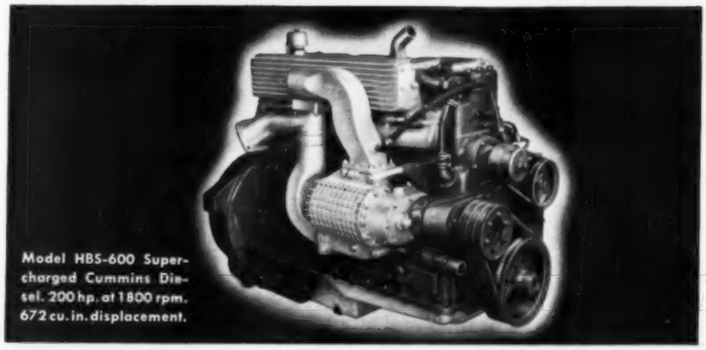
100% American!

The vital spot in any diesel is its fuel distribution and injection system. The Cummins fuel distribution and injection system was invented, developed and perfected in America by Americans. It is built in an American owned factory by American labor. This exclusive Cummins controlled system is responsible for the Cummins Diesel's remarkable record in every type of service—automotive, industrial, marine. No other diesel can offer this unique, simple, low-pressure system.

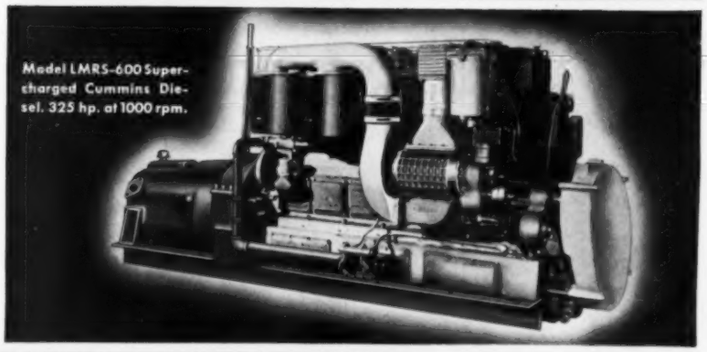
Because supercharging is the answer to less weight per horsepower, and lower cost per horsepower in diesel engines, the Cummins Engine Company is supercharging their entire line. Supercharged Cummins Diesels are now operating in all types of service, automotive, industrial, marine. They have already established a record which parallels the dependable performance of the standard models. *Repeat orders tell the story.*



Supercharging is the answer to low weight per horsepower. Model HMRS-600 Cummins Marine Diesel.



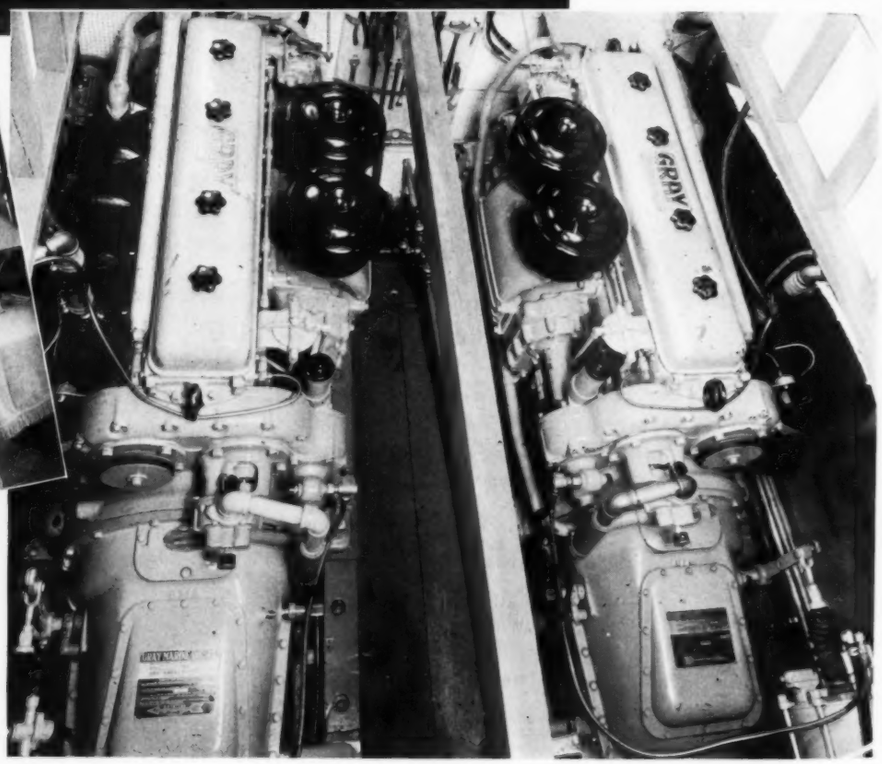
Model HBS-600 Supercharged Cummins Diesel. 200 hp. at 1800 rpm. 672 cu. in. displacement.



Model LMRS-600 Supercharged Cummins Diesel. 325 hp. at 1000 rpm.

CUMMINS ENGINE COMPANY • 2316 WILSON STREET • COLUMBUS, INDIANA

Thoroughly modern, the luxurious yacht, "Aquila" makes a maximum speed of seventeen mph. with her twin Gray Marine Diesels shown below. Lower left: View of the spacious deck house, looking forward.



"AQUILA"

By GEORGE D. CROSSLEY

"AQUILA" was built from the designs of Frederick C. Geiger of Yacht Sales & Service, Inc., by Hubert S. Johnson at Bay Head, N. J., for Philemon Dickinson, Esq., of Philadelphia. Her principal dimensions are as follows: loa—62′ 4″, beam extreme—13′ 8″, draft—3′ 9″.

Launched in February, "Aquila" proceeded immediately to Palm Beach where she was used for the remainder of the winter season. She is now based on the Chesapeake, and will be used there and in Eastern waters during the summer by her owner, who is a member of the Corinthian Yacht Club of Philadelphia, Pa. The yacht is powered with two 6 cylinder, 165 hp., Gray Marine Diesels, the engines built by General Motors and adapted for marine use by Gray Marine Motor Company. The engines are located under the deckhouse, driving 28″ x 26″ Hyde propellers. "Aquila" has a maximum speed of 17 mph. and cruises at 15 miles. The engine compartment, sound insulated throughout, also contains a 32 volt generator, Bendix controls, starting and lighting batteries, Lux fire extinguishing system, fuel tanks of 500 gals. capacity, and one of the fresh water tanks. Another fresh water tank, located forward, has a capacity of 320 gals. She is rather unusual in profile and arrangements for a craft of her dimensions. One of the principal requirements of the owner was that the deckhouse and cockpit adjoin one another and that they also be on one level. This necessitated locating the deckhouse aft and the remaining accommodations in the forward part of the boat.

She is of the trunk cabin type with a sweeping unbroken sheer. This, together with the slightly hollow stem and moderately flaring bow, give the yacht a particularly graceful appearance. All controls are located at the flying bridge which is reached from the main deck by a ladder on the starboard after side of the deck house.

Winning the Respect of Diesel Men Everywhere

SEALED POWER

PISTONS, CYLINDER SLEEVES *and* LINERS

SEALED Power serves the Diesel Industry on its requirements for completely machined CYLINDER SLEEVES and LINERS, both of ordinary and High Brinell hardness. Sealed Power castings for these sleeves and liners are made both by the centrifugal and sand cast methods, and due to the unusual fine grain and dense molecular structure have far greater wear resisting qualities. They are the choice of Diesel engine builders everywhere.

Sealed Power has complete special purpose machine tool equipment for producing all types of Diesel pistons, both in cast iron and aluminum alloy.

Sealed Power chromium molybdenum electric furnace alloyed iron pistons have the acceptance where extremely severe operating conditions are required.

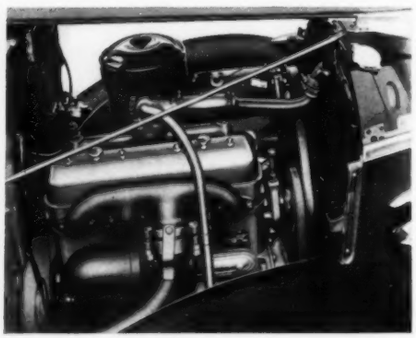
On aluminum pistons, equipment is available for treating the pistons by the Alumilite process which produces a hard, wear resisting finish.

Likewise, on cast iron pistons, equipment is available to give these pistons the Granoseal finish, which is inexpensive and yet prevents scuffing during the breaking-in period. Our engineering staff is at your disposal.

THE ACCURALITE COMPANY
Division of
SEALED POWER CORPORATION
MUSKEGON, MICHIGAN

HERCULES ANNOUNCES DIESEL REPLACEMENT ENGINES FOR 1940 CHEVROLET TRUCKS

HERCULES Motors Corporation has announced a "Power Package" Hercules Diesel Replacement Engine for Chevrolet Trucks. The unit has been completely engineered for the 1940 Conventional Model Chevrolet Truck and a Replacement Diesel for the 1940 Cab-Over-Engine Model will shortly be available.



Late in 1938 Hercules developed a "Power Package" replacement unit for Ford Trucks, marketing the engine through a nation-wide distribution set-up. Hercules Diesel engines for Chevrolet Trucks will be sold and serviced through the same type of outlets.

The basic engine design from which the Chevrolet "Power Package" unit has been developed is the well-known Hercules Model DOOD Diesel, 4¼" x 4½", and performance characteristics of this model have been thoroughly proven, not only in automotive service, but in many other types of industrial applications.

Installation of the Hercules Diesel Engine in the Chevrolet Truck chassis is quickly accomplished by any good mechanic with one helper. No major changes in the chassis are necessary. The engine is started with the same button used for starting the gasoline engine regularly furnished in Chevrolet Trucks. Speed is controlled by foot accelerator and the engine is stopped by a slight pull on a conveniently placed handle on the dash.

Hercules Diesel engines of similar type are said to be in successful operation in light trucks both in America and abroad. According to owners, the installation of the replacement is an exceptionally profitable investment where trucks cover 50,000 miles per year or more.

VANDALIA, MISSOURI

. . . . *Continued from page 45* . . . .

around the Burgess exhaust Snubbers and circulating the air with a motor driven fan. The building was kept comfortably warm through the severe winter of 1939-1940 and the system worked satisfactorily as planned.

The City had a single deep well and pump for the water supply so an additional well and pump were included in the project so as to have a duplicate and adequate supply. The pumping equipment was installed in one room of the lean-to of the building.

The installation comprises three Fairbanks-Morse Diesel engines and generators. Each unit is a 6 cylinder, 14" by 17" bore and stroke, 300 rpm. rated at 450 bhp. The generators are conventional 3-phase, 2400 v., having a capacity of 375 kva., giving 300 kw. at .8 PF. The exciters are 10 kw. belt driven units.

The auxiliaries are arranged along the engine room wall with all piping in a concrete trench so that it is accessible for maintenance and repairs. The fuel oil system includes a transfer pump, two 10,000 gallon each steel fuel oil storage tanks, and a day tank for each engine. These tanks are in a concrete pit and each is equipped with a meter for keeping an accurate record of the fuel used. The lubricating oil purifier is an Ames Renuoil of the latest type. Additional auxiliaries consist of three Burgess exhaust snubbers, an eighteen point Alnor pyrometer; three sets of American air filters of the OCH type; air receivers and temperature switches by Diesel Plant Specialties, and valves and piping by Crane.

The water obtained from the deep well is difficult to treat, so it was decided best to utilize a closed cooling system for the jacket water. The inner system has three pumps, each of the proper size for one unit, with the piping arranged so that any pump will circulate the water through any engine. The water is circulated through an atmospheric type heat exchanger set in the bottom of the cooling tower which was furnished by the Water Cooling Equipment Corp. The outer system has two motor driven pumps set in a small building, adjacent to the tower.

The switchboard was manufactured by the Marquette Electric Co. It has three generator panels, four feeder circuits (one being for the water works and power plant), and three series

street light circuits. There is a recording wattmeter which records the total station load on a continuous strip chart.

It was necessary to do a substantial amount of work on the electric distribution system, including new feeder lines to the power plant. The system was in rather poor physical condition, and a number of additional transformers, as well as larger copper, were added to give better service and reduce the line losses. A white way lighting system was installed in and around the business district, consisting of 88 ornamental concrete standards, equipped with 2500 lumen mazda lamps, and new bracket type street lights over the rest of the city.

The amount of the P.W.A. Grant was revised after completion of the negotiations for the purchase of the distribution system. The City still had funds in its construction account and decided to further improve the system and thereby obtain additional P.W.A. funds. A contract was then awarded to extend the white way lighting system. Another contract was also awarded for additional distribution system improvements and extensions, including a number of weather-proof socket type meters. A reinforced concrete storage reservoir was also constructed for the purpose of catching roof rain water from the power plant to use in the cooling system.

The City of Vandalia now boasts as being one of the best lighted small cities in the state. It has a total of 122 white way and 133 bracket lights. The distribution system has been built up to a very efficient point which is verified by the fact that the total line losses have averaged a little less than 10% of the amount of the electricity generated. The total cost of the project, including the purchase of the distribution system and all improvements was $190,953.00. The revised P.W.A. Grant Allotment was $78,757.00, so the net cost to the City was $112,196.00. The plant has been financially a success from the start due to the efficient management and operation, as well as the fact that the City took over all of the customers and load within the City. An audit report covering the first 10 months' operation showed these results:

Income including current billing		$33,332
Operating expenses, including production, distribution and office expense	$13,682	
Depreciation, provision for replacement, bond interest, etc.	4,458	
		18,140
NET PROFIT FOR 10 MONTHS' OPERATION		$15,192
Metered value of energy for street lighting furnished free and not included in above income		2,399
TOTAL NET EARNINGS FOR 10 MONTHS		$17,591

The new electric light plant, as well as the water works and other utilities, are managed by a Board of Public Works. This Board consists of Dr. R. Lee Alford, W. H. Schewe, J. C. Parrish, and O. S. Williams. The Board selected August Little as Superintendent of the Utilities. The Mayor and members of the Board of Aldermen deserve a lot of credit for their work and cooperation in the planning and installation of the electric system. We wish to especially congratulate Honorable Joe H. Ellis, Mayor, upon his able leadership, untiring efforts and the interest he has shown in this project. The Board of Aldermen consisted of W. H. Haas, R. A. Long, Edwin C. Waters, and Guy McCune. Mr. McCune did not live to see the fruit of his labors, and passed away about the time that the system was purchased. Mr. O. W. Ash was elected to fill the vacancy.

GENERAL MOTORS EXPANDS

DETROIT, Mich.—Construction that will double the manufacturing floor space, providing room for the ultimate doubling of production of the Detroit Diesel Engine Division of General Motors Corporation, will be started at once, W. T. Crowe, General Manager, announces.

A 600-foot by 280-foot addition will be built upon the south side of the present plant at Pere Marquette Railroad and Outer Drive. A new office building will be built immediately east of the enlarged structure. The office building will have two stories and contain approximately 40,000 square feet of floor space. Offices now are located in the main manufacturing building. Minor alterations to provide additional heating capacity for the plant will be made in the Diesel Research Laboratory Building in the rear of the plant area. Total floor space in the enlarged plant will be 379,000 square feet.

The present manufacturing plant and Diesel Research Laboratory were built in 1937 and put in service in January, 1938. The plant was built for the manufacture of the 71 or small series of General Motors Diesel engines, which continues to be its product.

The plant area comprises 75 acres. The original manufacturing building was 241 feet wide by 481 feet long. A small addition was built on the rear of this building a year ago. Architecture of the additions will follow the style of the original structure, the chief materials being brick, steel, concrete and glass. Approximately forty per cent of the wall and monitor roof areas is glass.

Normal growth in the adoption of GM Diesel power necessitates the plant enlargement, Mr. Crowe explained. The original plant had a capacity of 3,000 engines a year. The product of the Detroit plant goes to a variety of outlets.

The small Diesels which are made in one, two, three, four and six cylinder models, ranging from 15 to 165 horsepower go to both manufacturing and retail customers. The engines are converted for marine propulsion purposes and sold throughout the world by Gray Marine Motor Company of Detroit. The plant also supplies the Allis Chalmers Manufacturing Company with all engines that go in its Diesel tractors. More than a score of other American equipment manufacturers, such as shovel and pump makers, use the GM Diesel as standard motive power. The engines for the originally Diesel powered trucks and buses of the Yellow

Truck and Coach Manufacturing Corporation come from this plant.

Retail sales of the engine in the form of Packaged Power for all stationary purposes, for truck engine replacement and replacement of gasoline or Diesel engines in other mobile equipment are made through 100 outlets in the United States and Alaska of the Diesel Engine Division of General Motors Sales Corporation, with headquarters in Cleveland, where the Packaged Power assembly plant is located.

More than 5,000 of the small engines have gone into service in this and twenty-five other countries since the Detroit plant was opened.

Manufacture of the larger sizes of General Motors Diesel engines continues at the plant of the Electro-Motive Corporation in LaGrange, Ill., for railroad motive power and stationary power purposes and at the plant of the Cleveland Diesel Engine Division of General Motors Sales Corporation in Cleveland for marine installations.

CORRECTION

ON page 38, column 2 of our July issue, we state in error that Caterpillar filter elements are removed after 1200 hours of service.

This is incorrect. The statement should have read "after 120 hours of service." Sincere apologies from the Editor.

MACK MARINER INSTALLATIONS

THE Marine Engine Division of the Mack Manufacturing Corp. announces the recent installation of Mack MARINER Diesel engines for the following:

"Marylyn", salmon troller, owned by A. Hansen of Seattle, Washington. Equipped with Type W, 100 hp. Mack MARINER Diesel.

"Queen Flash", 45-ft. party fishing boat owned by Roxy Fiola of Highlands, N. J. Equipped with Type W, 100 hp. Mack MARINER Diesel.

"Jiboro", 40-ft. towboat owned by J. H. Coppedge & Co. of Jacksonville, Fla. Equipped with Type W 100 hp. Mack MARINER Diesel.

36-ft. ferry boat owned by Kirschner Bros. of Carteret, N. J. Equipped with Type W, 80 hp. Mack MARINER Diesel.

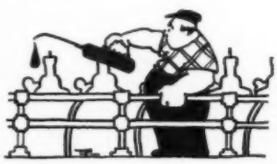
"Galatea", 68-ft. twin screw, Lawley-built yacht, powered by two Type Y 120 hp. Mack MARINER Diesels. Manchester, Mass. owner.

"O'Brien Service", 42-ft. tow boat owned by O'Brien Bros. of Rosebank, Staten Island, N. Y. Equipped with Type W, 100 hp. Mack MARINER Diesel.

48-Ft. party fishing boat owned by Israel Bauman of Brooklyn, N. Y. Equipped with Type W, 100 hp. Mack MARINER Diesel.

"The Millshire", 38-ft. sport fishing boat owned by Sophie Twardus of Hillside, N. J. Equipped with Type Y, 120 hp. Mack MARINER Diesel.

32-ft. sport cruiser built by Knute Petersen yard in Staten Island, N. Y. for Carl Ottersen, Freehold, N. J. Equipped with Type Y, 95 hp. Mack MARINER Diesel.



HUBER APPOINTED

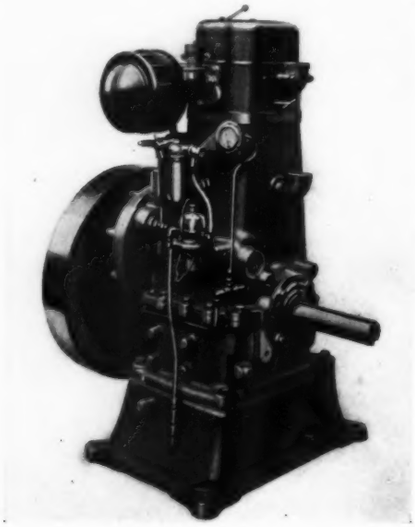
THE appointment of M. W. Huber as vice-president in charge of engineering and production of the Tuthill Pump Company, Chicago, Illinois, has just been announced by G. B. Tuthill, president.

Mr. Huber joined the Tuthill organization in 1933 as engineer in charge of development. Prior to that time, he was connected with the Pullman Company and the Western Electric Company. In 1938, Tuthill advanced him to general manager in charge of engineering, production and purchasing.

Since joining Tuthill, Mr. Huber has been responsible for a number of important developments in the company's pump division as well as in the refrigeration products division.

STOVER IMPROVES EFFICIENCY OF SMALL DIESEL ENGINES

THE Stover Manufacturing & Engine Company of Freeport, Illinois, announce a new line of Diesel engines, equipped with the Lanova combustion chamber, that develop more power per cubic displacement and per pound, and that can be sold at proportionately lower cost.



These new Stover Diesels are smoother running and more economical to operate. They now are available in four sizes and with a variety of mountings. The 7½ hp. and 10 hp. models are single cylinder. The 15 hp. and 20 hp. models are of the twin cylinder type. The illustration shows the conventional stationary type of mounting. The twin cylinder models have No. 1 Bell housing with enclosed flywheel. Stover's Diesel Bulletin No. 51 provides complete information covering this new line of Diesels.

BIRGER OLSON

THE Hooven, Owens, Rentschler Division of the General Machinery Corporation announces the appointment of Birger Olson, formerly with the Bureau of Engineering, U. S. Navy, as Chief Engineer in complete charge of all engineering details pertaining to U. S. Navy and other U. S. Government contracts. This appointment became effective Monday, July 15.